

any pieces that might be thrown to them. They commence calling just before daybreak; the cry is rather like the crow of a Cock, only whistled, not crowed.

268. CAIRINA MOSCHATA, Linn.

Common in the swamps of the low forests. *Anas boschas*, Linn., and *Dafla acuta*, Linn., are also given by Mr. Lawrence.

Fam. LARIDÆ.

269. HYDROCHELIDON PLUMBEA, Wils.

Common on the coast of British Honduras.

Fam. PELECANIDÆ.

270. PELECANUS FUSCUS, Linn.

Fam. COLYMBIDÆ.

271. PODICEPS DOMINICUS, Linn.; Lawr. *l. c.* vii. p. 334.

Fam. HELIORNITHIDÆ.

272. HELIORNIS FULICA, Bodd.; Lawr. *l. c.* vii. p. 302.

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November 8, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

The Secretary reported the safe return from India, on the 25th of July, of Mr. James Thompson, the Society's head keeper, with the following fine series of animals, which had been brought together for the Society at Calcutta by the exertions of their Corresponding Members the Baboo Rajendra Mullick of Calcutta, Mr. A. Grote of Alipore, Dr. John Squire and Mr. Wm. Dunn of Akyab.

*From Calcutta.*

- 2 Rhinoceroses (*Rhinoceros indicus*).
- 2 Black Cuckoos (*Eudynamys orientalis*).
- 2 Rose-coloured Pastors (*Pastor roseus*).
- 1 Rhinoceros Hornbill (*Buceros rhinoceros*).
- 2 Concave Hornbills (*Buceros cavatus*).
- 3 Green-necked Pea-fowl (*Pavo spicifer*).
- 3 Lineated Pheasants (*Euplocamus lineatus*).
- 2 Rufous-tailed Pheasants (*Euplocamus erythrophthalmus*).
- 1 Peacock Pheasant (*Polyplectron chinquis*).
- 2 Indian Tantali (*Tantalus leucocephalus*).

- 2 Indian Jabirus (*Mycteria australis*).
- 2 Saras Cranes (*Grus antigone*).
- 2 Land-Tortoises (*Testudo indica*).

*From Capetown.*

- 1 Black Kite (*Milvus niger*).
- 1 Crested Spizaëtus (*Spizaëtus occipitalis*).
- 3 Madagascar Francolins (*Francolinus madagascariensis*).

Mr. Thompson had experienced very few losses on the voyage home, the only noticeable occurrence under this head being the Polyplectrons. Of these birds a large number had been shipped at Calcutta, but nearly all of them died before reaching Madras.

Dr. Sclater also called the attention of the Meeting to several recent interesting additions to the Society's Menagerie, amongst which were—

1. A Brown Bear from Hakodadi, in the northern island of Japan, probably referable to *Ursus arctos*, var. *beringensis*, of Middendorf (Sib. Reise, ii. p. 4 *et seq.*). Dr. Sclater remarked that the Society now possessed living examples of the two distinct species of Bears from Japan referred to in the Fauna Japonica, Mamm. p. 29, as *Ursus ferox* and *Ursus tibetanus*. Of the latter, correctly named *Ursus japonicus*, a figure had already been given in the 'Proceedings,' 1862, pl. xxxii. p. 261. The former, on the authority of Von Schrenck (Amur-reise, i. p. 16), must be *Ursus arctos*, var. *beringensis*.

2. Pairs of the Sömmering's Pheasant of Japan (*Phasianus sømmeringii*). Fourteen birds of this fine species had been successfully imported into this country in June last by Mr. Reginald Russell, Corr. Memb., of which two pairs had been secured for the collection.

3. A young male Abyssinian Ass (*Equus tæniopus*, Heuglin), and a young female of the true Zebra (*Equus zebra*). These two acceptable additions rendered the series of the genus *Equus* in the Society's collection complete, it now embracing examples of all the six known species.

- (1.) *Equus hemionus* from Tibet, one female.
- (2.) — *onager* from India, Persia, and Syria, three females.
- (3.) — *tæniopus* from Abyssinia, one male.
- (4.) — *zebra* from South Africa, one female.
- (5.) — *burchelli* from South Africa, male and female.
- (6.) — *quagga* from South Africa, one female.

4. A second specimen of the Apteryx, or Kiwi, of New Zealand (*Apteryx mantelli*), presented to the collection by Major E. Ruek Keane, of Swyncombe, Henley-upon-Thames, on the 29th of September last. This bird (which appeared to be immature, and had been obtained by Major Keane in Auckland, in September 1863, from a Maori, who had caught it in a swamp in that neighbourhood) had been placed in the Collection, along with the female of the same

species, received in 1851. After a few days they agreed perfectly together; so that hopes were entertained that they would prove to be a pair, and that the eggs laid next season by the old female would prove to be fertile.

5. A fine living specimen of the rare Parrot of the Feejees (*Pyrrhulopsis splendens*, referred to, *anteà*, p. 158), which had been purchased from a dealer on the 27th of June last.

The Secretary laid before the Society a series of specimens of birds' eggs, collected in the vicinity of Barrackpore, and presented to the Society by Lieut. R. C. Beavan, of the Bengal Revenue Survey Department. The following is Lieut. Beavan's list of the species, with his notes on their nesting-habits. The nomenclature is that used in Dr. Jerdon's recently published work on the 'Birds of India,' where a description of the eggs will be found.

1. *ATHENE RADIATA*, Tickell; Jerdon, *Birds of India*, i. p. 143.

Two eggs from a hole in a tree. Maubhoon, April 1864.

2. *CYPSELUS AFFINIS*, Gray; Jerdon, *Birds of India*, i. p. 177.

Eggs from a nest under the roof of an out-house. Barrackpore, May.

3. *CAPRIMULGUS ALBONOTATUS*, Tickell; Jerdon, *l. c.* i. p. 194.

Two eggs laid on the bare ground. Maubhoon, April.

4. *CAPRIMULGUS ASIATICUS*, Lath.; Jerdon, *l. c.* i. p. 197.

Two eggs placed similarly to the last. Maubhoon, April.

5. *CAPRIMULGUS MONTICOLUS*, Franklin; Jerdon, *l. c.* i. p. 198.

Two eggs found on the bare ground. Maubhoon, March.

6. *MEROPS VIRIDIS*, Linn.; Jerdon, *l. c.* i. p. 205.

One egg taken from a female bird. Maubhoon, April.

7. *ARACHNECHTHRA ASIATICA*, Lath.; Jerdon, *l. c.* i. p. 370.

The nest of this species is domed like that of the European Wren (*Troglodytes vulgaris*). It is hung from the bough of a tree, to which it is attached by cobweb, the nest itself being chiefly composed of the same material. The bird is very common. Maubhoon, April 15th.

8. *DICRURUS MACROCERCUS*, Vieill.; Jerdon, *l. c.* i. p. 427.

The nest is made of loose twigs placed in a tree. Barrackpore, May.

9. *MALACOCERCUS TERRICOLOR*, Hodg.; Jerdon, *l. c.* ii. p. 59.

Builds in bushes. The nest resembles the English Blackbird's. Maubhoon, April.

10. *PYCNONOTUS PYGÆUS*, Hodg. ; Jerdon, *l. c.* ii. p. 93.  
Builds a very neatly made nest in a tree. Maubhoon and Barrackpore.
11. *COPSYCHUS SAULARIS*, Linn. ; Jerdon, *l. c.* ii. p. 115.  
Builds in bushes. Barrackpore, May.
12. *THAMNOBIA CAMBAYENSIS*, Lath. ; Jerdon, *l. c.* ii. p. 122.  
The nest of this species is roughly made of grass, bents, horse-hair, fragments of cast snake-skins, and fibres. The tree usually chosen for its situation is the Sal or Sakooa (*Shorea robusta*). Maubhoon, April 20th.
13. *CORVUS CULMINATUS*, Sykes ; Jerdon, *l. c.* ii. p. 295.  
Builds in trees. Maubhoon, April.
14. *CORVUS SPLENDENS*, Vieill. ; Jerdon, *l. c.* ii. p. 298.  
Builds a nest of rough twigs in trees. Barrackpore.
15. *DENDROCITTA RUFa*, Scopoli ; Jerdon, *l. c.* ii. p. 314.  
Builds like the Crows, in trees. Barrackpore.
16. *STURNOPASTOR CONTRA*, Linn. ; Jerdon, *l. c.* ii. p. 322.  
This species of Starling builds a nest composed of a large mass of material. The structure is domed, has a hole at one side, and is always placed in a tree. Barrackpore, May.
17. *ACRIDOTHERES TRISTIS*, Linn. ; Jerdon, *l. c.* ii. p. 325.  
Builds in holes in houses and verandahs. Barrackpore, May.
18. *PASSER INDICUS*, Jard. & Selb. ; Jerdon, *l. c.* ii. p. 362.  
Builds in holes in houses. Barrackpore, May.
19. *CROCOPUS PHENICOPTERUS*, Lath. ; Jerdon, *l. c.* ii. p. 447.  
The nest of this species is composed of twigs, and placed in trees. Maubhoon, April.
20. *TURTUR RISORIUS*, Linn. ; Jerdon, *l. c.* ii. p. 481.  
Builds like the preceding. Maubhoon, April.
21. *TURTUR CAMBAYENSIS*, Gm. ; Jerdon, *l. c.* ii. p. 478.  
Builds a nest similar to the two preceding Pigeons. Maubhoon, April.
22. *LOBIVANELLUS GOËNSIS*, Gm. ; Jerdon, *l. c.* ii. p. 648.  
Builds no nest, but lays its eggs on the bare ground. Maubhoon, April.
23. *ÆGIALITIS PHILIPPENSIS*, Scopoli ; Jerdon, *l. c.* ii. p. 640.  
This Plover scrapes a hole in the sandy bed of a river, in which it lays its eggs, making no regular nest. Maubhoon, March.

24. *ŒDICNEMUS CREPITANS*, Temm.; Jerdon, *l. c.* ii. p. 654.

The Stone Curlew, like the last, lays in a hole scraped in the ground. Maubhoon, April.

Mr. Gould exhibited a specimen of the *Emberiza pusilla* of Pallas, which had been lately captured in a clap-net near Brighton, being the first instance of its occurrence in the British islands. Also a specimen of the *Anthus campestris* of the Continent, caught in the same locality.

The Rev. H. B. Tristram, Corr. Memb., exhibited a pair of Sanderlings (*Calidris arenaria*) from Grimsey Island, Iceland, and three eggs, supposed to be those of that bird, received at the same time.

Mr. Fraser exhibited a mounted specimen of the Siamese Pheasant (*Euplocamus praelatus*), and a second pair of Horns of that exceedingly rare Bovine animal the *Budorcas taxicolor*, from his own collection.

The Secretary read the following extract from a letter received from Dr. W. Peters, For. Memb., dated Berlin, July 14, 1864:—

“Looking through Part I. of the ‘Proceedings’ for this year, I find the following passage in a paper of Dr. Gray’s (p. 58):—‘*Gerrhosaurus robustus*, Peters, Monatsb. 1854, p. 618. Dr. Peters gives the word *Caaiia* as the name of this Lizard; but, Dr. Kirk informs me, that word simply means “I do not know,” which was probably what the native said when he asked him what they called it.’

“As from this it might appear that I had collected the very important indigenous names of animals which I met with in Mozambique in a thoughtless and unwarrantable manner, you will allow me the following remarks:—

“1. The native name of the *Gerrhosaurus robustus* at Tette is not *Caaiia*, but *Calua* (English-pronounced, ca-ou-a), the former being a misprint, as has been remarked on the last page (p. 726) of the ‘Monatsbericht’ of the Berlin Academy for 1854.

“2. I never took down a name from a person whom I did not understand; and all native names which I have published have been carefully compared and corroborated by several persons.

“3. I resided in Tette from the 9th of December 1844 until the beginning of September 1845, where, of course, I knew every person, and where every one was anxious to oblige and assist me in my scientific pursuits.

“I am particularly indebted to Senhor Pascoal, Senhor Candido Jose da Costi Cardozo, Senhor Nunez, and Senhor Botelho for their assistance in pronouncing and writing the native names. All four were natives (not negroes), spoke very fluently the Portuguese language, and knew the productions of this country. In doubtful cases about the native names of zoological objects, they called their negroes, and the names were discovered.

“4. I got only two specimens of the *Gerrhosaurus robustus* (one

on the 25th of January, and the other on the 2nd of April, 1845), although I tried very much to get more specimens of this interesting and gigantic species. After having left Tette, my friend Pascoal wrote to me that his negroes had caught a 'Caúua' for me, which he sent to Quillimane, where I then resided. But this specimen died before the person to whom he confided it arrived in Quillimane, and was thrown away, to my great regret.

"5. If Dr. Kirk would look into my vocabularies (partly published by Dr. Black), 'The Language of Mozambique,' p. 290 (1856, London, printed by Harrison and Sons, St. Martin's Lane), he might find that 'pënu' (pronounced pai-noo) is the word which signifies, not only at Tette, but also at Jena and Quillimane, 'I do not know.'

"I cannot believe that the language of Tette can have changed so much since my time, that a word *which only exists in a misprint at Berlin* should have been introduced instead of a word which was used every day, and at the same time, in three different dialects.

"6. Neither did I hear that the *Gerrhosaurus* 'enters the fowl-houses and kills the fowls,' which is rather astonishing, as the *Gerrhosaurus* does neither climb nor fly, and the fowl-houses, at least at Tette, are provided with perches, on account of the rats. Dr. Kirk will, perhaps, be able to tell us whether the same native who gave him such valuable information about the *customs* and *common* appearance of the *Gerrhosaurus* was his teacher in the language of Tette."

The Secretary read the following extracts from letters recently addressed by Mr. R. Swinhoe, H. B. M. Consul in Formosa, to Dr. J. E. Gray:—

"Foochow, 27th July, 1864.

"Having been cruising about the Formosan Channel for the last month, I have arrived at last at Foochow; and being detained at this port a few days, I have managed to find leisure to make a few notes in zoology. The only strange mammal that has yet occurred here is a Porcupine (*Hystrix*, sp.?). It was killed before I got here, and unfortunately not preserved; I regret, therefore, that I have no remarks to offer as to its appearance. The people who shot it are positive that it was wild, though I strongly suspect it was brought up from Singapore in a junk. At Amoy I heard of some Hedgehogs (*Erinaceus*) having been offered for sale, but of what species I could not ascertain. They were said to have been taken in the vicinity. A gentleman here has two magnificent skins from Newchwang, the northernmost part of China. One is that of a Tiger, the Chinese race, pale, with few stripes; and the other that of a Leopard, evidently your *Leopardus japonensis*. I strongly suspect that the animal you procured with a Japanese stamp was a skin procured by the Japanese in their trading-stations. No Leopard is said by the Japanese to inhabit the islands of Japan.

"I am about to remove from Tamsuy to Takow, S. W. Formosa, very shortly. I am closing up and sending home all my collections, and will send you a memoir on the new mammals added to the For-

mosan list ; but this must wait till my return to that wild and solitary isle.



“*Viverra ashtoni*, n. sp. Shot at Suykaou, up the River Min, Foochow, by Mr. T. K. Ashton, and kindly lent by that gentleman to me for description. The skin is preserved flat, and the claws have been, unfortunately, cut away. It is the largest of the genus I have seen, and is quite a beautiful animal. Total length 4 feet ; tail 16 inches, heavy, bushy, and handsome, slightly tapering. Its ground-colour may be described as a light ochreous white, finely mottled with black ; blacker on the occiput, hind neck, fore shoulders, fore thighs, and along the back. The mottling effect is produced by some of the hairs having black tips, some being entirely black in the deeper parts. The downy fur or pile at the roots of the hair is brownish ash-grey. The paws are blackish brown, spotted with a deeper hue, the spots being carried up towards the thighs. Muzzle with a white patch on each side ; bars moderate, with a black spot on their outward bases. A united bar occurs behind the ears, and runs in a line down the side of the neck, curving downwards before reaching the shoulder, and nearly meeting on the under neck ; another crosses the lower throat, and another disconnected one twists about on either side of the neck below the first line. The neck is more decidedly white, edged with ochreous. From the nuchal bar

a black list begins to show, which takes a more certain form between the shoulders and runs down the back into the third dark bar of the tail. The hairs of this list are so thickly set, and so much longer than the rest of the fur, that they look as if added on by art. The tail has a pale indistinct bar at its roots, and four others along its length, the latter increasing in breadth and blackness as they approach the tip; they are stretched lozenge-shaped across the tail, being broader at their middles than at their sides. The rest of the tail is white, forming with the tip five bars. Before the eyes to the nose brown; moustache-bristles long and white, a few of the upper ones being brown.

“The animal does not appear to be well known in this neighbourhood, the present being the only instance of its having been observed and preserved by Europeans. I have taken its specific name from its discoverer, Mr. Ashton.”

“Tamsuy, 10th August, 1864.

“As I am now closing my collecting-operations in North Formosa, it would be as well to send you a few remarks on the more recent experience I have been able to acquire. The Monkey (*Macacus cyclopiis*) is distributed throughout the hilly country. We saw a large party of them the other day at Lungkeou.

“The Formosan Bear, I feel sure, is an undescribed animal. I have not been able to procure a perfect skin, but I procured some paws lately at Sawo Bay, and the cap of a savage covered with a patch of its skin. It is intermediate in size between the Bears of Japan and Thibet. It is about four feet and a half from muzzle to tail, and is clothed with rigid, somewhat short, black hair, and carries in the adult a crescent-shaped white mark on its breast between the fore legs. In the young this patch would appear to be brown; at least the Indian's cap above referred to had the mark on it of that colour. Of the paws, the fore paw measures, from the carpal joint to the end of the middle claw, 5 inches; its greatest breadth above is 3 inches: claws well hooked, and cultrated underneath: palm-pad nearly triangular, the apex towards the carpus, inclining outwardly; length  $2\frac{1}{2}$  inches, greatest breadth  $2\frac{8}{10}$ : each of the toes has bare oval pads underneath. Hind foot 6 inches in length measured underneath, greatest breadth above  $2\frac{8}{10}$ ; sole-pad an irregular triangle,  $3\frac{8}{10}$  long,  $2\frac{1}{2}$  greatest breadth; the pad of the outer and inner toes joining with the sole-pad, the rest of the toe-pads, as those of the fore foot, having cushions of hair between. Toe-pads of hind foot smaller than those of fore foot; claws not so long as in fore foot, and more covered with hair, being nearly hidden by it. For the Formosan Bear may I take the liberty of proposing the name *Ursus formosanus*? I have heard objections made to Formosa being formed into an adjective by the termination *anus*; but is not this liberty sanctioned by classical Latin in such a word as Augustani being applied to the people of the cities bearing the name Augusta?

“A few words now on *Leopardus brachyurus*. I have not seen this animal alive. At Sawo I procured two skins of adult animals



of this species, and at Lungkeaou (S. W. Formosa) one of an apparently younger specimen. They all show smaller heads than in Wolf's figure (P. Z. S. 1862, p. 347). All these skins have short tails, that of the Lungkeaou specimen not being ripped open; so that there can be no doubt of the distinctness of the species in that character from the *L. macrocelis*. This Lungkeaou specimen is lighter than those from Sawo in the tawny hue of its upper parts, and its pale under parts are nearly white; the streaks on its back are not so broad, and do not so frequently coalesce; its face is more narrowly and distinctly streaked, and its tail is more narrowly and numerously banded. The ears of all are black behind, with a light spot low down. Their moustache-bristles are some black and some white. The Lungkeaou skin is the only one that has legs. The feet appear to have been small, and the spots on the sides of the legs small and distinct.

Sawo skin . . . . .	Length 2 ft. 9 in., tail $22\frac{1}{4}$ in.	} including $\frac{3}{4}$ in. apical hair.
Sawo skin, No. 2..	Length 3 ft. 0 in., tail 25 in.	
Lungkeaou skin ..	Length 2 ft. 9 in., tail $30\frac{3}{4}$ in.	

“*Paguma larvata*.—I have received further specimens. The ears were in all small and round, as I described them; but the tail varies in length, and in the greater and less amount of black along its length.

“*Vespertilionidæ*.—Most of the Bats that fly about of an evening are small, and, I think, of the same species as those procured at Taiwanfoo. I have, however, a couple of specimens of a small Leaf-nose, taken in the cave at Kelung, which will be interesting. The other day I observed a species (of *Pteropus*?) of a bright colour, about 8 inches long, hanging by the heels on a large leaf. I, unfortunately, had no gun with me, and, trying to knock him down with my stick, missed him. The Chinese are very unsuccessful collectors of Bats, and very rarely bring me examples.

“*Porcula taiwana*.—I have not managed to procure or get a sight of an adult. The largest I have seen was perhaps half-grown, in which the stripes and spots still remained. The natives insist that the animal is so marked all its life. I have purchased several young ones, with the view of sending them to the Society, but have not succeeded in inducing them to live. One lived with me for over a month. I took it to Foochow with the hope of getting it off all safe, but it died the day after my arrival at that place. A half-grown Pig of this species was bought by a friend here. It was very wild, and always jumped furiously at any person that came near its pen. It was covered with rather long bristles, longest down the back, and had a white tail. I despair, for the present, of getting a specimen in this vicinity; but I may meet with it again in the south. I will now enumerate the additions that I have made to my first list of eighteen species of Mammals of Formosa (P. Z. S. 1862, p. 347).

“19. *Lutra nair*, with white sides to its neck. An indifferent skin seen at Sawo, in the hands of Chinese there; doubtless killed on the island.

“20. *Manis brachyurus*? When I was in Takow, in 1861, I

heard from the natives of the existence of this beast in the island; and in Dutch books on Formosa I saw it spoken of as the 'Taewan Devil,' the old Hollanders, like the Chinese, not being able to divine to what class of the animal kingdom it belonged. I have succeeded in procuring a specimen, and am sending it home. It is almost sure to be the South China species, *Manis brachyurus*; but, not having specimens to compare with it, I cannot set this down as a certainty.

"21. *Sorex myosurus* (the Musk-Rat of China). Not uncommon about Chinese houses in Tamsuy.

"22. *Sorex* —, sp.? I found a nest of this under a decayed patch of buffalo-dung, and secured two small Shrews; they are small and immature, and closely affine to the foregoing, but destitute of the musk-odour, and, I think, of a different species. I am sending them home for determination.

—"23. *Mus decumanus*. Very common, and rather variable in colour.

—"24. *Mus musculus* (the House-Mouse). I have seen, in houses here, little creatures which I have taken to be of this species.

"25. *Mus coninga*, Swinhoe, P. Z. S. 1864, p. 185. This species does not affect trees, like the *M. flavescens* of China.

"26. *Mus* —? About one-third the size of the common Rat, and of rather similar colour, with softer fur and small feet. From the interior. I was intending to give a full description of this apparently new species, but I find my specimens have been already packed and forwarded to M. Verreaux.

"27. *Mus* —? With reddish-brown back, interspersed with black hairs, whitish under parts, large head, and rounded ears. I picked up a mutilated specimen on a hill not far off. It is almost twice as big as a common Mouse, with longer tail. It appears to be a field species, and is probably undescribed. I have, unfortunately, not been able to procure good specimens.

"This is all I have at present to offer on the Mammals.

"I have been of late rather assiduous in collecting land shells. From this neighbourhood I have got nearly thirty species, from South Formosa four, and from Foochow two. The South Formosan, comprising three *Helices* and one *Bulinus*, are all distinct from those we meet with here. But both the Foochow species have close allies in Kelung, differing only enough perhaps to note them as varieties. But my knowledge of shells is so limited that I must refrain from talking too wildly of species and varieties, and leave those nice distinctions to the deeper learning of Mr. Cuming and Dr. Pfeiffer.

"I trust these notes will interest you. They may be worth communicating to the Zoological Society. You will probably not hear from me again until I have made some progress in Takow (South Formosa)."

"Formosa, Sept. 5th, 1864.

"With regard to my report on the Formosan Mammalia, it is necessary to make some corrections with regard to the supposed *Porcula*. Hitherto I had only received very young specimens, and,

relying on the reports of the natives as to its carrying its stripes at a mature age, I was led to suppose the animal a second species of Hodgson's genus *Porcula*. I have, however, lately had four live wild Pigs brought to me, which, judging from their appearance, I should take to be from five to six months old; and in this estimate I am borne out by the fact that it is during March and the commencement of April that sucklings are brought to us by the country-people. Two of the four pigs sulked and died; a third battered himself to death; and the fourth was very unmanageable, and eventually showed an inclination to droop, so that I was obliged to have him killed. In their grunts, squeaks, and other noises emitted, they were entirely *porcine*. The largest is about  $2\frac{1}{2}$  feet from snout to rump, and about  $1\frac{1}{2}$  foot high at the shoulder; tail  $2\frac{3}{4}$  inches long, with a further  $\frac{3}{4}$  inch length of hair at tip. The undeveloped state of their teeth and skulls generally proclaim their juvenility, so that the mature animal would be probably twice as large at least. The distinct bands have disappeared, and their incisors project in the usual manner of typical pigs. They are therefore wrongly referred to *Porcula*, but more properly belong to true *Sus*. I have three skins and three skulls. The general colour of the upper parts is yellowish brown, thickly mixed with black hairs, which give the fur a mottled appearance. A patch just before the shoulder, and another on the forehead before the eyes, are paler and more free from black hairs. The black hairs are longest on the back of the neck and on the rump. The under parts and tail are white, more or less mixed with black hairs. The chin is dark fuscous. A triangular line of white runs away from the angle of the mouth, bounded on each side by a line of black hairs. This last character calls to my mind the peculiar characteristic of the Japanese Wild Pig (*Sus leucomystax*); and indeed they may be of that species, which is probably also the Wild Pig of South China, if it be true that the Domestic Chinese Hog is descended from that wild stock. The appearance of these animals would doubtless have altered with advancing age; but they may be sufficiently stamped to indicate the species. I have no copy of the 'Fauna Japonica' with me to refer to. I am sending the specimens home, and will leave you to settle the question of their identity or otherwise with the Wild Japanese Pig. I may eventually succeed in getting a full-grown animal, and may perhaps manage to get live specimens home for the Gardens. I have no pigs' skulls to compare with those of our species. There is, however, a drawing of those of *Sus scrofa ferus* and *Sus pliciceps* illustrating a paper by you in the 'Proceedings.' The skull of *Sus taivanus* is at once distinguishable from either of these by its well-rounded forehead, and by the sides of the parietal and temporal bones being well convex instead of concave. But it is not, of course, with *Sus scrofa* that this has to be compared, as, from the external appearance of the skins, there is not the least chance of our pig being referable to that species."

The following papers were read:—

1. NOTES ON THE SKELETONS OF WHALES IN THE PRINCIPAL MUSEUMS OF HOLLAND AND BELGIUM, WITH DESCRIPTIONS OF TWO SPECIES APPARENTLY NEW TO SCIENCE. BY WILLIAM HENRY FLOWER, F.R.S., F.R.C.S., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

Having had an opportunity during the autumn of examining personally the extensive collections of skeletons of Cetacea contained in several public and private museums in the Netherlands, I have put together some notes, chiefly with reference to the *Balænoidea* or Whalebone Whales. I trust that they may be of interest to students of this branch of zoology, as affording an indication of the localities in which the different specimens are to be found, and also as a contribution towards elucidating the difficult subject of the specific and generic characters of these animals, more especially of the subfamily *Balænopterinae*, or Fin-Whales.

Before proceeding further I am glad to avail myself of this opportunity of expressing my thanks to the directors of the various museums which I visited, and especially to Professor Schlegel of Leyden, Professor Van Beneden of Louvain, and M. le Vicomte Du Bus of Brussels, not only for their liberality in giving me unrestricted access to the treasures under their care, but also for numerous personal acts of kindness during my stay in their respective cities.

Certain general observations that have occurred to me during the examination of the osseous remains of Cetacean animals will form a necessary prefix to the special notes, in order to give an idea of the means employed in arriving at conclusions in reference to the specific distinction or identity of different individuals. These will be followed by some remarks upon the classification and nomenclature employed in speaking of the various species of Whales.

The alterations which take place in the bones at different periods of life render it an object of primary importance in investigating the skeletons of Cetacea, to ascertain as near as may be the relative age of the individual under examination. Unless this is carefully recorded, the description cannot be considered as complete. For this purpose the condition of the osseous tissue generally, the development of the various apophyses, especially those of the vertebræ, the state of the sutures of the cranium, and of the epiphyses of the vertebral column and of the bones of the pectoral limb afford the best indications.

In the early periods of life the bones have a peculiarly fibrous or spongy texture, and the apophyses, especially the spines and transverse processes of the vertebræ, are obviously unfinished, being abruptly and roughly truncated. Even to a comparatively late period portions of the cartilaginous skeleton, as the ends of the transverse processes of the cervical vertebræ, the olecranon, and the upper border of the scapula, remain unossified; and the peculiar appearance presented by the surface of the bone in this condition is such that it cannot be mistaken by the careful observer. This applies of course to macerated skeletons; for, as Eschricht has demonstrated, the form of each bone of the adult skeleton is defined at a very early stage of

foetal life in cartilage; and the peculiar characteristics of the mature animal can be obtained far more accurately from the examination of such a specimen, than from that of the bony portion only of the partially ossified skeleton of a half-grown individual.

In young skeletons all the bodies of the vertebræ have readily detached disk-like epiphyses at each end. These commence to unite to the main portion of the bone at the two extremities of the series, the union in the case of the central vertebræ not taking place until most other signs of immaturity in the skeleton have disappeared. I have observed also that in the individual vertebræ it is usually the epiphysis furthest removed from the middle of the column, *i. e.* the anterior one in the cervical region and the posterior one in the caudal region, which first join the body of the bone. It is stated by Professor Owen that "this embryonic condition is not obliterated at any age in these gigantic aquatic mammals, which, being sustained in a medium of nearly their own specific gravity, have more need of flexibility than firmness in the vertebral column"\*. Certainly in the large majority of museum specimens the vertebral epiphyses, at least in the dorsal and lumbar regions, are still unattached; but their union with the bodies of the vertebræ, and the complete obliteration of all trace of their original autogeneity, throughout the vertebral column in the adult animal is well seen in the large skeletons of Common Fin-Whales (*Physalus antiquorum*) in the British Museum, Alexandra Park, Rosherville Gardens, and Antwerp Zoological Gardens.

The humerus has two epiphyses, upper and lower; the radius and ulna also two each. The order in which these unite to the diaphysis is as follows:—That of the lower end of the humerus and upper end of the ulna and radius about the same time, then that of the upper end of the humerus; these are all united before the epiphyses of the bodies of the dorsal and lumbar vertebræ. Lastly, and only at a comparatively late period of life, when the vertebral column is completed, do the peculiar small rough nodules of bone developed in the mass of cartilage which forms the lower end of the radius and ulna become united to the shaft.

The obliteration of the sutures of the cranium affords some indications as to age: for instance, the distinctness of the basisphenoid from the presphenoid and basioccipital bones, and of the exoccipitals from the supraoccipital, indicates a very early condition; but after the union of these, very little change takes place, except the soldering of the supraoccipitals with the parietals and frontals, the majority of the bones remaining, as far as I have yet had an opportunity of observing, distinct and separable throughout life.

We are able from these indications to divide, for practical purposes, all the skeletons that may be met with into three stages of growth. I. In the first, all the epiphyses of the vertebral column, and of both ends of the humerus, radius, and ulna, are still separate, and the processes of the vertebræ are very incomplete. The animal remains in this condition until it has attained to more than half the length of

\* Descrip. Cat. Osteol. Series, Mus. Roy. Coll. Surgeons, 1853, vol. ii. p. 440.

the adult (e. g. *Balænoptera rostrata*, Mus. Roy. Coll. Surg., 17' long; *Physalus antiquorum*, The Hague, 40' long; *Megaptera longimana*, Leyden, 28½' long; ditto, Louvain, 33' long). This stage of growth may be designated as "young"; towards its close the majority of the bones lose the spongy character of the "very young" animal, and acquire the firm structure characteristic of succeeding ages.—II. In the next stage, both epiphyses of the humerus, those of the upper end of the radius and ulna, and those of the bodies of the anterior cervical and the posterior caudal vertebræ are united, while those of the greater part of the column are still free. The ossification of the transverse processes of the cervical vertebræ, although often still incomplete at the ends, has gone on so far as to give them in great measure the characteristic form seen in the adult. This is a condition in which skeletons are frequently seen in museums. The animal while in this stage, which may be called "adolescent," has attained nearly its full size (*Balænoptera rostrata*, Mus. Roy. Coll. Surg., 25' long; *Balæna mysticetus*, *ibid.*, 47'; ditto, Brussels, 50'; *Megaptera longimana*, *ibid.*, 46'); the reproductive functions have also come into action (*Balæna mysticetus*, ♀, Mus. Roy. Coll. Surg., pregnant).—III. The last stage, or the perfectly "adult," in which all the vertebral epiphyses are ankylosed, I have met with among the Balænoidea only in the large Fin-Whales of the common species mentioned before. Adult Hyperoodons and other Delphinoids are not uncommon in collections.

It is possible that variations may occur in different species or different individuals in the order of completion of the several parts of the skeleton. The foregoing observations are founded upon a careful examination of upwards of twenty skeletons of Whalebone Whales of different species. If not complete, they at least indicate a line of inquiry important to the exhaustive study of the anatomy and zoology of the Cetacea.

The next point to which I would draw attention is the amount of variation found among different individuals of the same species—a point which will assist greatly in determining what differences in similar specimens may be considered as specific; and yet it is one which cannot absolutely be settled until the limits of the species themselves are definitely fixed. Some years ago, when many species which we now know to be very different were thrown together into one, the individuals of a supposed species were found to vary extremely among themselves. It is possible that the same error may be made at present, and species still confounded which more critical examination will show to be distinct. We must feel our way cautiously, and I shall therefore under this heading only take for illustration some of the best-known and most generally accepted species, and see what can be derived from an examination of some of their best-marked characteristics.

First, as to variations in size. It will help much in determining specific identity of new or little-known species, if we can show, among those that are well known, what is the usual amount, and what the limit, of variation in this direction; for we may assume that it is at

least probable that the same laws govern the different members of a group so well-defined as the Whales. No species of Balænoïd Cetacean is so well determined as the Northern Right Whale (*Balæna mysticetus*), and of none are we able to adduce so many instances of the size that various individuals of the species have attained. A skeleton in a late stage of the adolescent period in the Museum at Brussels measures a little over 50' in length; and Scoresby, as is well known, states that out of 322 examples examined by him no one exceeded 60' in length; indeed the largest measured was 58', being one of the longest, to appearance, that he ever saw. The adult animals must then have a tolerably limited range of variation, within a few feet of either side of 55'. Again, the common and well-marked species *Balænoptera rostrata*, the dwarf of the family, is still in the adolescent stage at 25' long, and there is no instance recorded in which it exceeded 31'. The adult Hump-backed Whale (*Megaptera longimana*) appears to range within 45' and 50' in length. In the Common Fin-Whale (*Physalus antiquorum*) we have evidence of variation at an adult age and in the same (male) sex, of from 60' (Rosherville Gardens) to nearly 70' (Alexandra Park and Antwerp Zoological Gardens). It is possible that this species may sometimes attain a few feet longer, but all the cases in which this is stated require fresh investigation. The alleged length of a Whale in the flesh is rarely to be depended on, and even the given measurements of skeletons are often inaccurate, as much depends upon the method of articulation. Size being in the popular mind a point of vital importance in a Whale, the tendency to exaggerate this quality is a constant obstacle to exact investigation. We may conclude, then, that all the evidence at present available tends to prove that the idea which some naturalists entertain, that Whales have no definite limit to their growth, is incorrect, and that, as in other mammals, there is an average size to which each species attains, subject to individual differences within a moderate range.

The number of vertebræ and number of ribs have been supposed to be subject to considerable individual variation, partly in consequence of several distinct species having been confounded, and partly from the loose way in which these bones have been counted from defective or badly articulated skeletons; but in fact, subject to the exceptional circumstances about to be mentioned, they are quite as constant among the Cetacea as among other Mammalia, and are therefore characters of the highest importance in determining species. Every example of *Balænoptera rostrata* that I have examined in museums, or found recorded, has eleven pairs of ribs, and a total number of vertebræ amounting to 48 or 50. In like manner skeletons of *Physalus antiquorum*, when complete, appear always to have 15 pairs of ribs and 61 or 62 vertebræ. *Megaptera longimana* has 14 pairs of ribs and 53 vertebræ; *Balæna mysticetus* 12-13 pairs of ribs and 54 vertebræ. It frequently happens that the last pair of ribs only attain a rudimentary condition, and, their heads not articulating with the vertebræ, they are lost in preparing the skeleton. This condition of the last (15th) pair of ribs is well seen in the ske-

leton of *Physalus antiquorum* in the Alexandra Park, prepared by Mr. Gerrard, jun.; they measure, the one  $19\frac{1}{2}$ " in length, the other 27", and taper to a point at their upper extremity, being suspended in the position they originally occupied, far removed from the vertebral column. A small rudimentary additional rib, or pair of ribs, attached to the first lumbar vertebræ is sometimes developed; but a fully formed pair of ribs above the normal number is, I believe, never met with.

As to the number of vertebræ, a small amount of latitude may usually be allowed on account of the difficulties connected with the terminal bones of the tail. Very often in specimens in museums several of these are wanting, owing to carelessness in preparing the skeleton; and by a less excusable carelessness the circumstance may not be noted in published accounts of the number of vertebræ possessed by the specimen. But even if all are present, slight discrepancies in enumeration readily occur. In early periods of life, the last vertebra, although certainly formed in cartilage, is not ossified, and the penultimate has so much the appearance afterwards assumed by the last, as frequently to be taken for it; or, again, later in life two or even three of the terminal vertebral elements grow together so as to form a single osseous mass, which is counted as one or several bones according to the discretion of the observer. Therefore, even in well-described skeletons, a discrepancy of one or two in the given number of caudal vertebræ is of no great consequence; but there is no evidence to prove the occurrence of any greater variation in any given species.

It would be interesting to collect an account of the numerous and various differences in detail found in the osteological structure of several individuals of each well-determined species; but to do this with advantage would cause me greatly to exceed the limits originally proposed to this paper. I shall have occasion to mention some of them hereafter, and will next proceed to give such a sketch of the arrangement of the genera of the Whalebone Whales as may explain the names assigned to the different specimens mentioned in the following notes. The materials at our disposal are still so scanty, that I do not suppose that the classification now offered may not hereafter require modification; but it has not been attempted without a personal examination and a very careful consideration, at all events, of all the more important osteological characters of several individuals of each genus.

I perfectly concur with those naturalists who divide the Cetacea into two primary sections, which merit, it appears to me, the rank of suborders. The BALÆNOIDEA or MYSTICETE, or Whalebone Whales, and the DELPHINOIDEA or ODONTOCETE form two natural and equivalent groups, separated from each other by the following (among many others of less importance) trenchant distinctions:—

I. BALÆNOIDEA. Teeth never functionally developed, but always disappearing before the close of intra-uterine life. Upper jaw provided with plates of baleen. Sternum composed of a single piece, generally broader than long, and connected only with the first rib.



No costo-sternal bones. All the ribs at their upper extremity articulating only with the transverse processes of the vertebræ; their capitular processes, when developed, rudimentary, and not forming true articulations with the bodies of the vertebræ. Rami of mandible curved, their anterior ends meeting at an angle, and connected by fibrous tissue, without any true symphysis. Skull symmetrical. Maxilla produced in front of, but not over, the orbital process of the frontal. Nasal bones well developed, symmetrical. Lachrymal bones distinct from the jugal\*.

II. DELPHINOIDEA. Teeth always developed after birth, and generally numerous, sometimes few and early deciduous. No balcen. Sternum elongated, composed of several pieces placed one behind the other, to which are attached the ossified cartilages of several pairs of ribs. The anterior ribs with capitular processes developed, and articulating with the bodies of the vertebræ, as in other Mammalia. The posterior ribs without head, and only articulating with the transverse processes. Rami of mandible straight, the two coming in contact in front by a surface of variable length, but always constituting a true symphysis. Upper surface of the skull generally, if not always, unsymmetrical. Upper end of the maxilla expanded, and produced over the orbital process of the frontal bone. Nasal bones rudimentary and unsymmetrical. Lachrymal bone confluent with the jugal.

In conforming with all the above characters, the Sperm Whales are true Delphinoids; but into the further divisions of this group I do not at present propose to enter.

The *Balænoidea* fall naturally into two families, the *Balænidæ* or *Leiobalæniæ* (Eschricht), Smooth Whales or Right Whales, and the *Balanopteridæ* or *Ogmobalæniæ* (Eschricht), Furrowed Whales or Rorquals.

1. The *Balænidæ* have a very large head (exceeding one-fourth of the total length of the body); no dorsal fin; the under surface of the throat and chest smooth. The bones of the cranium greatly arched, so as to leave a wide interval between the upper and lower jaws. The rostrum narrow and compressed at the base. The orbital processes of the frontals very much prolonged, and extremely narrow and rounded on their upper surface. Tympanic bones broad, rhomboid. The coronoid process of the lower jaw scarcely perceptible. Baleen-plates long and narrow. All, or the greater number of the cervical vertebræ ankylosed together. Hand broad and pentadactylous.

The members of this family are not sufficiently distinguished from

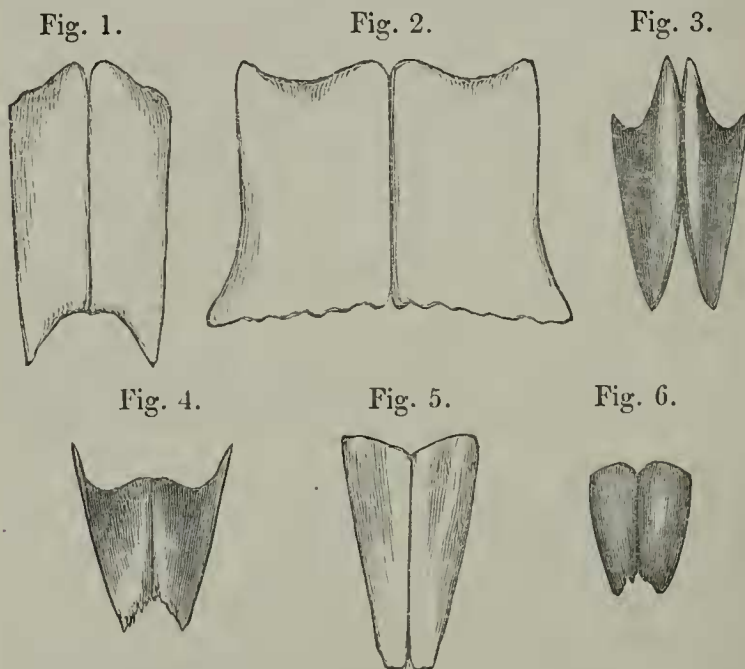
\* The statements, in works of comparative anatomy and zoology, regarding the lachrymal bone of the *Balænoidea*, afford a curious example of the difficulty of eradicating a mistake when once it has become incorporated in scientific literature. The defective condition of most of the skulls preserved in museums was undoubtedly the original source of error; but, notwithstanding Cuvier's distinct description, in the skull of the Rorqual, of the bone "qui ne peut être que l'analogue du lacrymal" (Oss. Foss., édit. 1836, t. viii. p. 275), the absence of the lachrymal is repeated as a character of the section in many of our most valued treatises.

each other to warrant their division into subfamilies; but they constitute two tolerably well-marked genera (*Balæna*, Linn., *pars*, and *Eubalæna*, Gray), which present the following among other less-marked distinctive characters:—

(1.) *Balæna*. Total number of vertebræ 54. Pairs of ribs 13. Head more than one-third of the total length of the body. Nasal bones long and narrow (fig. 1). Orbital processes of frontals much elongated, sloping backwards, and very little dilated at their extremity. Cervical vertebræ all ankylosed. Baleen-plates very long, and narrow at the base.

Type species *B. mysticetus*, Linn., at present the only one known. The most specialized in structure of all the Whales.

(2.) *Eubalæna*\*. Total number of vertebræ 57–58. Pairs of ribs 15. Head less than one-third of the total length of the body.



Upper surface of nasal bones of Whales of different genera,  $\frac{1}{10}$ th nat. size.

- Fig. 1. *Balæna mysticetus*. Mus. Roy. Coll. Surg.  
 2. *Eubalæna australis*?. Mus. Leyden.  
 3. *Megaptera longimana*. Mus. Brussels.  
 4. *Physalus antiquorum*. Mus. Roy. Coll. Surg.  
 5. *Sibbaldius schlegelii*. Mus. Leyden.  
 6. *Balænoptera rostrata*. Mus. Roy. Coll. Surg.

\* The very few skeletons of members of this genus in Europe present considerable discrepancies, which have never been satisfactorily investigated. As the Leyden specimens are the only ones I have seen, the above characters are taken from them; but I have now reason to believe that they do not belong to *E. australis* (Desm.). Dr. Gray, in a recent paper (*Ann. and Mag. Nat. Hist. Nov.* 1864), makes three genera of the Southern Whales—*Eubalæna*, *Hunterus*, and *Coperea*.

Nasal bones short and broad (fig. 2). Orbital processes of frontals moderately long, and widening considerably at their outer extremity, directed nearly horizontally outwards. First five cervical vertebræ only ankylosed (?). Baleen-plates moderately long, and broad at the base.

Type species, *E. australis* (Desm.). Probably several other species, including *Balæna biscayensis*, Eschr.; but these are not yet well determined\*.

2. *Balænopteridæ*. The head less than one-fourth of the total length of the body. A dorsal fin. Skin of the under surface of the throat and chest provided with numerous parallel longitudinal furrows. The bones of the cranium very slightly arched. The rostrum broad at the base, gradually tapering, depressed. The orbital processes of the frontal moderately prolonged, broad, and flat on the upper surface. Tympanic bones elongated, ovoid. The coronoid process of the lower jaw more or less developed. Baleen-plates short. Cervical vertebræ usually all free. Hand narrow and tetradactylous.

This family may be divided into two minor groups or subfamilies, the *Megapterinæ* (genus *Kyphobalæna*, Eschricht), or Humpbacked Whales, and the *Balænopterinæ* (genus *Pterobalæna*, Eschricht), or Fin-Whales.

(1.) *Megapterinæ*. Dorsal fin low, obtuse. Orbital process of frontal much narrowed externally. Scapula high and narrow; acromion and coracoid process absent or rudimentary. Metacarpus and phalanges greatly elongated.

This division contains, as far as is known at present, but one genus—*Megaptera*, Gray, characterized, in addition to the above, by a total number of vertebræ amounting to 53, and 14 pairs of ribs. Coronoid process of lower jaw low, obtuse. Nasal bones narrow, pointed at both ends, rising to a sharp ridge in the middle line, and deeply hollowed at the sides (fig. 3).

Type species, *M. longimana* (Rudolphi).

(2.) *Balænopterinæ*. Dorsal fin falcate. Orbital process of frontal nearly as broad at the outer extremity as the base, or somewhat narrowed. Scapula low, broad, with a long acromion and coracoid process. Metacarpus and phalanges of moderate dimensions.

Van Beneden ("Faune Littorale de Belgique," Acad. Roy. Belg. vol. xxxii. 1860) has recognized the distinctive characters of three species belonging to this group, which he calls *Pterobalæna communis*, *P. gigas*, and *P. minor*. Dr. Gray (Proc. Zool. Soc., May 24th, 1864) constitutes these three species as the types of distinct genera, which he has named *Physalus*, *Sibbaldius*†, and *Balænoptera*; he also

\* In a valuable monograph ('Om Nordhvalen,' Copenhagen, 1861), lately published in the Danish language, by Eschricht and Reinhardt, and about to be translated into English under the auspices of the Ray Society, it is conclusively proved that the habitat of the *Balæna mysticetus* is, and always has been, exclusively confined to the Polar Seas, and that it has therefore no claim to a place in the European fauna. The Right Whales of the North Atlantic, formerly chased by the Basque whalers, belonged to this section of the family.

† I hope my kind friend Dr. Gray will excuse me, if I venture thus to modify the generic name "*Sibbaldus*," originally proposed by him.

makes a fourth genus, *Benedenia*. Although I am as little disposed as any one to multiply generic names (a tendency of modern times of which we are all apt to complain), I cannot help admitting that, if the genera of Whales are to be at all equivalent in value to those now generally received in other groups of mammals, the first three of these are perfectly valid. Of the genus *Benedenia* I speak with more hesitation, as it is constituted only upon the examination of a very young individual, which I confess I am unable to distinguish from a *Physalus*. As the diagnostic characters given by Dr. Gray are brief, and limited to certain parts of the organization, I may be permitted perhaps to give more detailed characters taken from the skeleton generally, which will, I think, fully confirm his views as far as these genera are concerned. Into those characters, taken from the external form, position of dorsal fin, or from the visceral anatomy, it is not my purpose to enter at present.

A. *Physalus*, Gray. Total number of vertebræ 61-64. Ribs 15 pairs\*. Orbital process of frontal bone considerably narrowed at its outer end. Nasal bones short, broad, deeply hollowed on their superior surface and anterior border (fig. 4). Rami of the lower jaw massive, with a very considerable curve, and a high, pointed, curved coronoid process. Neural arches of the cervical vertebræ low; spinous processes very slightly developed. Transverse process of the atlas arising from the upper half of the side of the body, long, tapering, conical, pointed directly outwards. Upper and lower transverse processes, from the second to the sixth vertebræ, well developed, broad, flat (and united at the ends in the adult, forming complete rings?). Head of the first rib simple, articulating with the transverse process of the first dorsal vertebra. Second, third, and sometimes the fourth ribs with capitular processes, reaching nearly to the bodies of the vertebræ. Sternum broader than long, in the form of a short broad cross, of which the posterior arm is very narrow; it might perhaps be compared to the heraldic trefoil (fig. 7); it is subject, however, to considerable individual modifications.

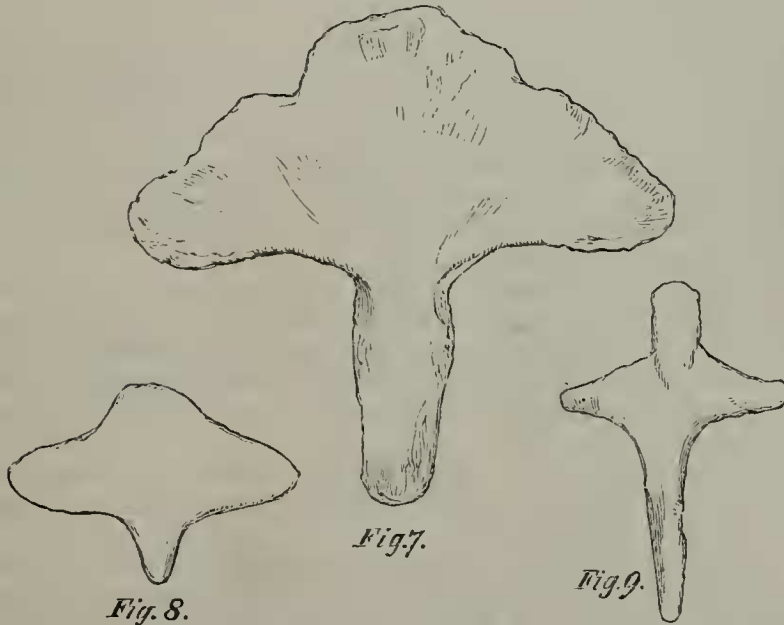
Type species, *P. antiquorum*, Gray.

B. *Sibbaldius*, Gray. Total number of vertebræ 56-58. Ribs 14 pairs. Orbital process of frontal bone nearly as broad at outer end as at the base. Nasal bones elongate, narrow, flat, or very slightly hollowed on the sides of the upper surface, obliquely truncated at the anterior end (fig. 5). Lachrymal bones thickened and rounded at the outer end. Lower jaw with a comparatively slight curve, and a low, obtusely triangular coronoid process. Neural arches of the cervical vertebræ high, and their spines well developed. Transverse process of atlas arising from upper two-thirds of side of the body, short, and deep from above downwards (figs. 10, 11). On the hinder border of the under surface a median pointed triangular process, directed backwards and articulating with the axis. Upper

\* A specimen (*Physalus sibbaldii*, Gray) in the museum of the Hull Philosophical Society is said to have sixteen pairs of ribs—the highest number recorded in any Whale. If constant to the species, a modification of the above generic character will be required.

and lower transverse processes of the second to the sixth vertebræ inclusive well developed, broad, and flat (united at their ends in the adult, except the sixth?). Lower process of the sixth short, broad, and much twisted on itself. Head of the first rib bifurcated into an anterior and posterior division, articulating with the extremities of the transverse processes of the seventh cervical and first dorsal vertebræ respectively. Second, third, and fourth ribs with short capitular processes. Sternum very small, short, and broad, somewhat lozenge-shaped (fig. 8). Stylohyals very broad and flat (fig. 17).

Type species, *S. laticeps*, Gray\*.



Sternal bones of Fin-Whales of different genera.  $\frac{1}{10}$ th nat. size.

Fig. 7. *Physalus antiquorum*. Alexandra Park.

8. *Sibbaldius schlegelii*. Mus. Leyden.

9. *Balænoptera rostrata*. Mus. Roy. Coll. Surg.

*C. Balænoptera*, Lacépède, *pars*. Total number of vertebræ 48-50. Ribs 11 pairs. Orbital process of frontal almost as broad at the outer end as the base. Nasal bones rather narrow and elongate, truncated at their anterior ends, convex on the upper surface in both directions (fig. 6). Rami of lower jaw much curved, and with a high, pointed coronoid process. Cervical vertebræ usually separate; but this family character not unfrequently departed from

\* Dr. Gray, with good reason, refers the Whale stranded at Charmouth, in 1840 (Sweeting, Proc. Zool. Soc. 1840), to this genus. There is not, as far as I am aware, a skeleton or skull of a *Sibbaldius* preserved in any of the museums in this country; we possess, however, at the College of Surgeons a lower jaw, pair of first ribs, pair of scapulae, atlas, and some other vertebræ. Their origin is unknown.

by the union of the second and third, or the third and fourth, by their arches. Neural arches high; spines moderately developed. Transverse process of atlas arising from the middle of the body, elongated, tapering, directed outwards, and slightly upwards. Upper and lower transverse processes of axis and succeeding vertebræ, to the sixth inclusive, well developed. Those of the axis broad, flat, and in the adult united at their extremity; those of the other vertebræ slender, and never united at their extremity, except occasionally in the sixth and more rarely in the fifth vertebra. Head of the first rib simple; capitular processes scarcely developed upon any of the ribs. Sternum longer than broad, having the form of an elongated cross (fig. 9).

Type species, *B. rostrata* (Fabricius).

All the Fin-Whales which I have had an opportunity of examining fall under one or the other of these groups. There may possibly be others, which will need either a new genus to be formed for their reception, or a modification of some of the differential characters given above. The number of species in the genera *Physalus* and *Sibbaldius* is at present very uncertain. In *Balænoptera*, as far as is known, there is but one—*B. rostrata*, Fab.=*Pterobalæna minor*, Eschricht and Van Beneden\*.

It may perhaps be useful to place the arrangement of the *Balænoidea* in a tabular form, so as to show the relation of the different divisions to one another (see opposite page). The table also exhibits at a glance the progressive steps in the classification of the group made since the time of Linnæus, by Lacépède, Eschricht, and Gray respectively.

I will next proceed to notice in systematic order the specimens of skeletons and skulls of Whalebone Whales contained in the Royal Museum at Leyden.

*Balæna mysticetus* (the Greenland Right Whale).—This species is represented only by the skull of a very young individual in rather an imperfect condition. It is 5' 2'' in length, and 2' 10½'' in greatest breadth across the squamosals. The elements of the occipital bone are distinct; but the parietal is already ankylosed with the supra-occipital along the upper margin of the temporal fossa. The basi-sphenoid is distinct from both the presphenoid and basioccipital, though the union with the latter is the more advanced of the two. At this stage the skull differs much from that of the adult animal. Besides the proportionately greater size of the cranial cavity, the orbital processes of the frontals are shorter, and broader at their extremity, the maxillaries are less arched, and the skull generally much more depressed.

The Southern Right Whale (*Eubalæna australis*?).—Of this species, or perhaps I should say of one of the species confounded together under this name, the collection contains a very fine skull of an

\* Barkow (Das Leben der Walle, &c., Breslau, 1841) has described another species under the name of *Pterobalæna pentadactyla*; but much uncertainty hangs over the origin and composition of the single skeleton in the Museum at Breslau, on which it is founded. If genuine, it would necessitate a considerable modification of both the family and generic characters.

Order.	Suborder.	Families.	Subfamilies.	Genera.	Type species.
CETACEA.	BALENOIDEA seu MYSTICETE. Gen. <i>Balena</i> , Linn. { Whalebone Whales.	BALENIDÆ. Gen. <i>Leuobalena</i> , Esch. Smooth Whales, or Right Whales.	BALENINÆ.	{ <i>Balena</i> , Linn., pars. <i>Eubalena</i> , Gray.	{ <i>B. mysticetus</i> , Linn. Greenland Right Whale.
		BALENOPTERIDÆ. Gen. <i>Balenoptera</i> , Lacép. Furrowed Whales, or Rorquals.	MEGAPTERINÆ. Gen. <i>Kyphobalena</i> (Esch.). Humpbacked Whales.	{ <i>Megaptera</i> , Gray. <i>Physalus</i> , Gray.	{ <i>M. longimana</i> (Rud.). Northern Long-finned or Humpbacked Whale.
		BALENOPTERINÆ. Gen. <i>Pterobalena</i> (Esch.). Fin-Whales.	BALENOPTERINÆ. Gen. <i>Pterobalena</i> (Esch.). Fin-Whales.	{ <i>Sibbaldius</i> , Gray. <i>Balenoptera</i> , Lacép., pars.	{ <i>P. antiquorum</i> , Gray. Common Fin-Whale. <i>P. laticeps</i> , Gray. Rudolph's Fin-Whale. <i>B. rostrata</i> (Fab.). Lesser Fin-Whale.

adult and a nearly complete skeleton of a young individual, both obtained from the Cape of Good Hope by Dr. Horstok. These are briefly described by Schlegel in his 'Abhandlungen aus dem Gebiete der Zoologie, &c.' (Leiden, 1841), part 1, p. 37.

The skull is 13' 5" in extreme length. To any one accustomed to the appearance of the skull of the adult *B. mysticetus*, the differential characters exhibited by this specimen are very striking. The size is much inferior, both absolutely and as compared with that of the body of the animal. Its general contour is less regularly arched, as it rises abruptly in the occipital region to a very prominent and rounded eminence at the junction of the supraoccipital, frontal, and nasal bones, and then slopes gradually down to the apex of the beak. The articular processes of the squamosals are broader and less elongated. The supraorbital processes of the frontal are, as noticed by Schlegel, directed more horizontally outwards, shorter, and very much stouter, especially at the extremity. The orbital processes of the maxillary are also stouter. One of the most marked differences from *B. mysticetus*, and one which I have not before seen noticed, is the great breadth and comparative shortness of the nasal bones (fig. 2), and consequent great width of the posterior margin of the nasal aperture. The part of the upper surface of the two nasal bones uncovered by the frontal is  $13\frac{1}{2}$ " broad and 11" long; in a skull of *B. mysticetus*, 17' in length, they are but 7" broad and 11" long. The malar, lachrymal, and tympanic bones are absent from this skull.

The skeleton is that of a young animal; the epiphyses of all the vertebræ and of both ends of the humerus, radius, and ulna are not united. It wants the lachrymals, malars, sternum, hyoid and pelvic bones. The entire length is 31' 4", of which the head occupies 7'. The total number of the vertebræ is fifty-six; and one, or perhaps two, may be wanting from the end of the tail. The first five of the cervical vertebræ are united together; the bodies of the other two are greatly compressed and close together, but not ankylosed. There are fifteen pairs of ribs. The first, as described by Schlegel, is of very singular shape, being divided at the upper end for a distance of 6" into two broad flat heads, anterior and posterior, and widening exceedingly at the lower end, in the middle of the border of which is a deep notch. It is 34" in length, measured in a straight line, 4" in breadth at the middle, and  $12\frac{3}{4}$ " at the lower end. The two divisions of the upper end are attached to the transverse processes of the first and second dorsal vertebræ, which disposition induced Schlegel to assign sixteen dorsal vertebræ to this specimen; but this is probably an error of the articulator, as in the Fin-Whales with double heads to the first rib, these are connected with the seventh cervical and first dorsal vertebræ; and in *B. mysticetus* the head of the first rib is placed altogether in front of the transverse process of the first dorsal vertebra, being intimately connected with the seventh cervical.

The second rib is very thick and broad at the lower end. The last rib is much shorter and more slender than the others. There are nine chevron bones present. The scapula is 26" broad and 24"



high, with very short acromial and coracoid processes. The humerus 15'' long. The radius 16½'' long, and 10'' broad at its distal end. The ulna 8'' broad at the same part. The thumb is absent; the digits differ but slightly from each other in length. The second, third, and fifth have, besides the metacarpal bones, each four phalanges; the fourth has five; but, as they are artificially articulated, these numbers are not entirely to be depended on.

*Megaptera longimana*.—A nearly complete skeleton of a young animal, obtained from Greenland through Eschricht. It is 28' 7'' long, of which the skull is 7' 7''. There are but thirteen ribs present.

Genus *Physalus*.—A skull of a young specimen, agreeing in all its characters with *P. antiquorum*, Gray; marked "*Balænoptera physalus*, Mer Sept." Its length, from the condyles to the tip of the beak in a straight line, is 10' 6''.

Genus *Sibbaldius*.—A skeleton marked "*Balænoptera physalus*, Vinisch, Zuider Zee." This is no. 17 of Eschricht's list (*Untersuchungen über die Nordischen Wallthiere*, Leipzig, 1849), according to which it was taken in the Zuider Zee, near Monnikendam, Aug. 29th, 1811, its length being 32' Rheinland. The skeleton is perfect, with the exception of the hyoid and pelvic bones. The malars, lachrymals, and tympanics are present. The entire length (including the skull, which is 6' 7'') is 29' 7''; but the bodies of the vertebræ are placed close together, so that 2 or 3 feet should be added for the intervertebral spaces. The animal was young; the epiphyses of all the vertebræ, including that of the hinder surface of the axis, are separate from the bodies, as well as those of both ends of the humerus, radius, and ulna. The vertebral formula is C. 7, D. 13 or 14, L. 16 or 15, C. 19=55; but the last caudal is elongated, and really consists of two bodies ankylosed, with even a minute rudimentary third. The cervical vertebræ exhibit all the characters peculiar to the genus; but their lateral processes are, as the surface of the bone shows, incomplete at the ends. The atlas has a deep, compressed-from-before-backwards, short transverse process, and a backward-directed, median triangular projection on the under surface of its body for articulation with the axis. The five following vertebræ have each an upper and lower transverse process, but not united together at their ends in any of them—not quite, even in the second. The processes are of tolerably equal length throughout, except the lower one of the sixth vertebra, which is shorter and broad, and twisted on itself so that its flat surface is horizontal at the end. The upper processes are slenderer than the lower, and become more so posteriorly. The spaces between the upper and lower processes, in vertical height, are in the second 2''·2, in the third 4''·2, in the fourth 4''·2, in the fifth 4''·1, in the sixth 4''·7. The spines are comparatively well developed, especially that of the axis.

There are thirteen pairs of ribs present; but it is probable that the posterior pair are wanting. The first has a bifid articular head, the cleft extending to the depth of 5 inches. It articulates by this with the transverse processes of the seventh cervical and first dorsal. Its extreme length in a straight line is 21''; its breadth at the middle

$2\frac{3}{4}$ " at the lower end  $4\frac{1}{4}$ ". The second, third, and fourth have short capitular processes, not reaching halfway to the bodies of the vertebræ. These processes are absent in all the others. The longest rib (the fifth) is 41" in a straight line, the twelfth is 31", and the thirteenth 30". There are ten chevron bones present. The sternum is remarkably small for the size of the animal, a transversely elongated lozenge in shape, 4" in antero-posterior and 8" in transverse diameter.

The scapula is, as usual in the family, much elongated transversely, and has a long acromion process. Its length is 14", its breadth 25". The humerus is 10" long; the radius  $18\frac{1}{2}$ ", and proportionately slender. The hand, artificially articulated, is 18" long; the second digit has, besides the metacarpal, three bones, the third three bones, the fourth six bones, the fifth three bones. These numbers are probably not correct, as they do not correspond with a natural skeleton of the hand of the same species at Brussels.

The upper surface of the orbital plate of the frontal is almost of a rhomboid form. The malars are very thin; the outer end of the lachrymals forms a thick, projecting, rounded knob. The nasal bones are almost straight across their anterior ends, slightly longer at the middle, and sloping away at the sides; their upper surface tolerably flat, but raised to a low ridge in the middle towards the anterior end, and slightly hollowed on each side of this. The dimensions of the cranium are given in the table at p. 402, compared with those of other specimens of the genus. The inferior maxillaries have low, obtusely triangular coronoid processes. They are articulated too close to the head, and their upper edge rotated too much inwards. This position greatly diminishes their curve as seen from above, and causes their extremity to bend downwards. I was much interested in observing this, as it explains away a great peculiarity in the figure of the Whale in the Berlin Museum by Rudolphi (*Abhandlungen Acad. Berlin*, 1822), in which the same mode of articulating has caused some misconception as to the character and relation of these bones, the more important to be rectified, as this is the only figure extant of the skull of any member of this genus.

The question now naturally arises, to what species is this skeleton to be referred, and what should it be named? There can be little doubt that it is identical with the above-mentioned specimen described by Rudolphi; at least a careful perusal of his description and figure (for I have not seen the skeleton) leaves this impression on my mind. In habitat, age, size, number of vertebræ and ribs, and all other important osteological characters they agree. There are certainly slight differences in the proportions of the parts of the cranium, but not greater than are found among different individuals of undoubtedly the same species; and it is possible that even these may arise from inaccuracies on the part of the artist. Some of the evidence also is wanting to make the comparison complete; for instance, the sternum from the Berlin specimen, and the hyoids from the one at Leyden. In assigning only five vertebræ to the cervical region, Rudolphi is obviously in error, being probably misled by the mode in which the skeleton was articulated. He states that the transverse

processes of the cervical vertebræ have all (that is, the first five) very large holes. If this is strictly correct (that is, if the holes are completely surrounded by bone), it indicates a more advanced state of ossification than in the Leyden specimen—a circumstance, of which the peculiarity is somewhat diminished by the fact that the skeleton of a Whale of the same species, and of almost exactly the same size, in the Brussels Museum is in a condition intermediate between the two, the processes of the second and third vertebræ being completely united, but not those of the fourth and fifth. In calling his specimen *Balæna rostrata*, Rudolphi was acting upon the idea, then prevalent, of the specific unity of many of the northern Fin-Whales now known to be distinct. Dr. Gray seems to have been the first to point out that it differed from all Whales which had been previously described with anything like definite accuracy, and gave it the name of “Rudolphi’s Finner Whale,” *Balænoptera laticeps* (Zoology of the Erebus and Terror, 1846); this name therefore has the right of priority for the species. Unfortunately it is anything but expressive of the character of the species, the head not being broader than in other Fin-Whales, as the following table, compiled chiefly from my own measurements, will show.

In the first three columns are given the actual length of the cranium, greatest breadth (at the squamosals behind the orbit), and breadth across the middle of the beak, in inches; and in the last two, the proportionate breadth of the skull and beak to the total length, the latter being reckoned at 100.

	Length of cranium.	Breadth of cranium.	Breadth of beak.	Proportion to length.	
				Breadth of skull.	Breadth of beak.
<i>Physalus antiquorum.</i>					
Adult. Antwerp.....	184	96	33	52	18
Adult. Louvain.....	179	78	32	44	18
Adult. Alexandra Park.....	186	86	36	46	19
Adult. Rosherville Gardens.....	168	75	34½	45	20
Young. Leyden.....	126	60	26	48	21
Young. Mus. R. Coll. Surg. ....	111	56	22½	50	20
<i>P. —?</i>					
Utrecht. (Mus. Lidth. de Jeude) ..	118	60	32	51	27
<i>Sibbaldius.</i>					
Adult. Ostend. (Approximation } from Dubar’s measurements)..	256	118	..	46	..
Adolescent. From Java, in Ley- den Mus. ....					
Young. Leyden.....	79	40	16	51	20
Young. Brussels.....	80	38	15	48	19
Young. Berlin. (Approximation } from Rudolphi’s figure).....	78	36	18	46	22
<i>Balænoptera rostrata.</i>					
Adolescent. Brussels.....	63	34	13	54	21
Adolescent. Mus. R. Coll. Surg. ..	65	35	15	54	23
Young. Mus. R. Coll. Surg. ....	48	24	9½	50	20

It is seen by this that the individual differences among specimens of *Physalus* and *Sibbaldius* are considerable, the proportionate breadth of skull ranging in the first case between 44 and 52, and of the beak between 18 and 21, and in the second genus between 46 and 51, and 19 and 22; and these differences do not seem at all to be regulated by age. A slight allowance must certainly be made for errors arising from the difficulty of measuring straight lines with exactness, especially single handed, upon these large irregular objects. On the whole, however, the specimens of *Sibbaldius* have no advantage on the score of breadth. The examples of *Balenoptera rostrata* are slightly broader than the others in proportion to their length.

Van Beneden is of opinion that this specimen, as well as that at Berlin, is referable to the same species as the very large female Whale taken near Ostend in 1827, the skeleton of which was exhibited some years ago at Charing Cross; and as this animal was 87 feet in length (larger than the ordinary size attained by the Common Fin-Whale), he has given it the specific name of *gigas*. Unfortunately this skeleton is no longer available for examination\*; and the only descriptions and drawings we have of it are not made with the scientific accuracy necessary to settle the question. It certainly agrees in many important points—the number of vertebræ (54, a few wanting from the end of the tail) and of ribs (14), the double head of the first rib, and the small broad sternum. Its generic identity is therefore undoubted.

One difficulty which arises in my mind is about the size. The 32'-long examples of *Sibbaldius* at Leyden and Brussels are, as I have said, in the *young* stage; but still the general condition of the bones shows them to be by no means in the earliest period of youth. A Common Fin-Whale (*Physalus antiquorum*) that I examined at the Hague, 40' long, had the bones much softer, more spongy, and incomplete at the ends of the processes than in either of these; whereupon I should *à priori* have said that the latter belonged to a species which, when adult, was smaller than the common one. As far as we know at present, the young of Fin-Whales are from one-fourth to one-third of the length of the mother at the time of birth, which would give a very early age to our specimens if derived from such a parent as the Ostend Whale. As these speculations upon the size and growth of Whales are, however, based upon very slight foundation, I must still admit the possibility of the specific relationship of the Ostend Whale with the representatives of *Sibbaldius laticeps* in the Museum of Berlin, Leyden, and Brussels.

During the present year the Leyden Museum has received the skeleton of a Fin-Whale taken on the north-west coast of the island of Java, and of which I am, with Professor Schlegel's permission, enabled to give the following description. According to the statement received with the specimen, Whales are of rare occurrence upon that coast, the present one having been an object of great curiosity to the natives.

\* It was shipped for the United States; perhaps some naturalist in that country may be able to discover whether it is still in existence.

The hands, from the carpus downwards, the pelvic bones, and some of the terminal caudal vertebræ are wanting, also the lachrymals and malars from the skull; in other respects the skeleton is complete. Not being yet articulated, the separate bones could be examined with great facility. Both epiphyses are ankylosed to the bodies of the three first cervical vertebræ; the anterior epiphyses only are united on the fourth and fifth. From this as far as the ninth caudal, inclusive, they are detached; on the tenth caudal the hinder, and on the succeeding ones both epiphyses are firmly united. On the humerus the upper epiphysis is partly, and the lower one completely united to the shaft, all traces of the original separation of the latter having disappeared. The upper epiphyses of the radius and ulna are in the same condition; but those at the lower end are separate. The transverse processes of the cervical vertebræ show, from the condition of their terminal surfaces, that they are not quite complete. The upper edge of the scapula appears completely ossified in the middle, but must have been cartilaginous towards the two extremities. These conditions taken together show that the animal was in the adolescent stage, and had probably attained very nearly its full size.

The skull is 9' 8" long in a straight line; the vertebræ, placed close together and without their epiphyses, measured 30'; so that, allowing for the epiphyses, intervertebral spaces, and the end of the tail, the animal could not have been less than 45 feet long.

The number of vertebræ present is 54; and 3, or probably 4 of the caudal are wanting, raising the total number to 57 or 58. Of these, 7 are cervical, 14 dorsal, and about 13 or 14 lumbar; but, the articular surfaces for the anterior chevron bones not being well marked, I could not be certain where the tail should be considered to begin. There are 14 pairs of ribs.

The skull presents the general characters of the genus *Sibbaldius*. The only important difference that I could find between it and the specimen last described is in the form of the orbital process of the frontal bone, which is narrower at its outer end, approaching more to the form characteristic of *Physalus*, although by no means so narrow as in this. The nasals (fig. 5) are long and narrow, nearly flat on their upper surface, and slightly shelving downwards from the middle line. Their anterior border is rather less produced near the middle line than at the sides—the reverse in this respect to the Zuyder Zee specimen. The tympanic bones are 4''·6 long, 3''·5 in greatest breadth, and 2''·5 thick: their form is seen in the annexed woodcut (fig. 16). The lower jaw has a very slight curve and a low coronoid process, the highest part of which is 20'' from the hinder end of the bone. It is triangular in form, rounded at the apex, with a base about 4'' in breadth, and rising about 2½'' in height. The principal dimensions of the skull, in inches, are given in the following table, compared with those of the skulls of the two other specimens of the genus mentioned in this notice.

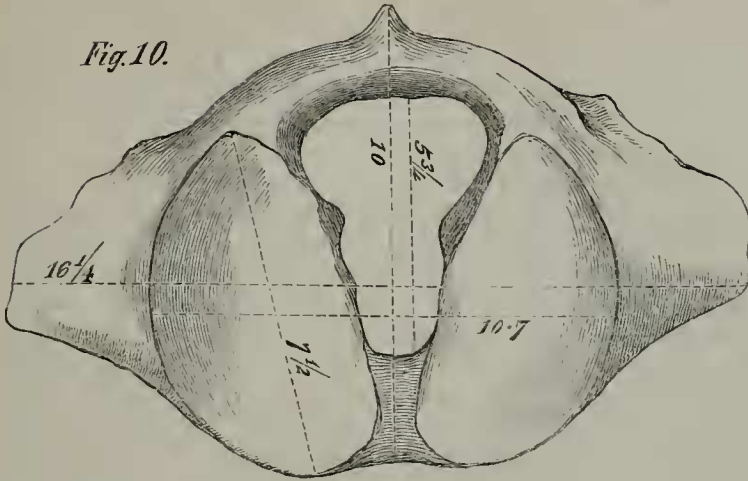
	Java : Leyden Museum.	Zuyder Zee : Leyden Museum.	North Cape : Brussels Museum.
Length of skull in straight line.....	116	79	80
Breadth of condyles .....	10 $\frac{1}{3}$	10	9
Breadth of exoccipitals .....	41	26	27
Breadth of squamosals (greatest breadth of skull) .....	57	40	38
Length of supraoccipital .....	29 $\frac{1}{2}$	21 $\frac{1}{2}$	21
Length of articular process of squamosal .....	22	15	16
Orbital process of frontal, length .....	22	13	13
Orbital process of frontal, breadth at base .....	24 $\frac{1}{2}$	16	15
Orbital process of frontal, breadth at outer end.....	15	12	11
Nasals, length .....	10 $\frac{1}{2}$	6 $\frac{1}{2}$	6 $\frac{1}{4}$
Nasals, breadth of the two, at posterior end .....	2	2 $\frac{1}{2}$	3
Nasals, breadth of the two, at anterior end .....	6	4	4
Length of beak, from middle of curved border of maxillary to the tip of premaxillary .....	82	53	50
Length of maxillary .....	90	57	55
Projection of premaxillary beyond maxillary .....	6	5	3
Greatest width of nasal aperture .....	10	6 $\frac{1}{2}$	
Breadth of maxillaries at posterior end .....	11	9	8
Breadth of maxillaries across orbital processes (following the curve) .....	63	43	43
Breadth of beak at base (following the curve) .....	42	30	30
Breadth of beak at middle (following the curve) .....	22 $\frac{1}{4}$	16	15
Breadth of maxillary at same point .....	6	4	4
Breadth of premaxillary at same point .....	4	3	2 $\frac{1}{2}$
Length of lower jaw in a straight line .....	117	78 $\frac{1}{2}$	76
Height at coronoid process .....	14	9	9
Height at middle .....	9 $\frac{1}{2}$	7 $\frac{1}{4}$	
Amount of curve* .....	8 $\frac{1}{2}$	6	6

The atlas presents the characteristic features of this bone in other members of the genus in a very marked degree. The transverse process is particularly deep from above downwards, and much twisted. The spinal canal is contracted in the middle; the articular surfaces for the axis are not confluent at their lower margins, but between them is a distinct, oval, transversely elongated facet, and another smaller round one is situated on the upper surface of a pointed triangular projection from the hinder border of the inferior surface of the bone, which runs under the body of the axis. There are thus four distinct articular surfaces in connexion with the second vertebra. The extreme width of the bone is 16 $\frac{1}{4}$ " ; the length of the inferior surface of the body 4''·4 including the triangular process, which is 1''·5. The other dimensions are shown in the sketches (figs. 10 and 11).

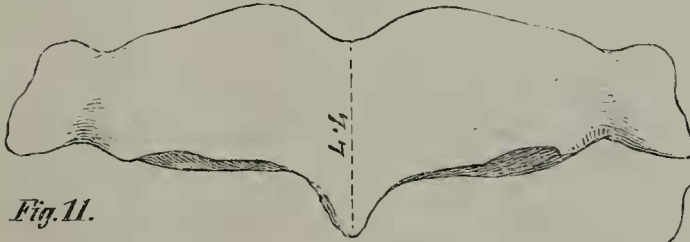
The axis (fig. 12) has the usual form of this bone in the Fin-Whales. The odontoid process is represented by a slight rounded elevation, with a depression in the centre; and besides the two large lateral articular surfaces for the atlas, there are two small median facets, one on the lower part of the anterior and one on the inferior

\* Greatest distance of the inner surface of the jaw from a straight line drawn between the extremities.

*Fig. 10.*



*Fig. 11.*



*Fig. 12.*

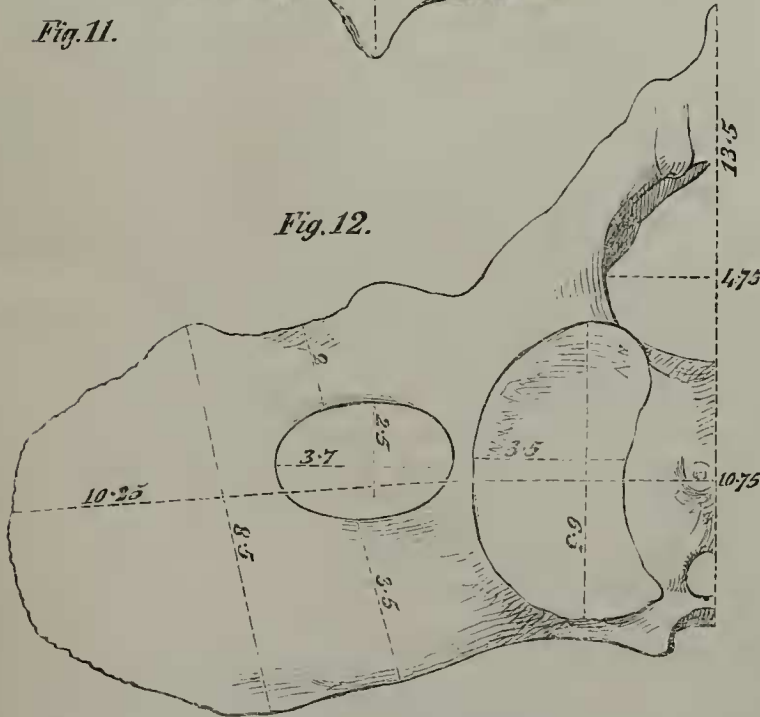


Fig. 10. Atlas; anterior surface.  
 11. Atlas; under surface.  
 12. Axis; anterior surface.

surface, corresponding to those above described in the first vertebra. The neural arch is high and massive, and the spine well developed. The lateral processes are large wing-like plates, directed somewhat backwards, with a regularly oval perforation rather above the middle of their base. The dimensions are given in the figure, which is drawn to scale, regardless of perspective.

The third, fourth, and fifth vertebræ much resemble each other; they have rounded oblong bodies, high triangular neural canals, spines gradually increasing in length, and well-developed upper and lower transverse processes completely united together at the ends, leaving large oval spaces between them. In the sixth the transverse processes do not meet by the space of 3 inches; and I doubt if they ever would meet in the process of growth, on account of the different planes of their ends. The upper one is long, with its flat surface almost vertical; the lower one, short and broad, with a stout conical tuberosity projecting forwards and downwards from its base, turns so completely on itself that its broad terminal end is directed horizontally; it is, moreover, very nearly complete. The peculiar form of this process is highly characteristic of all the specimens I have examined of the genus *Sibbaldius*, though it is best marked in the one under consideration, being the most mature. It should be mentioned that, when the series is placed together, a gradual approach to its form is seen in the lower processes of the antecedent vertebræ. The seventh cervical vertebra has no trace of an inferior transverse process. The thicknesses of the under surface of the bodies of the five last cervical vertebræ, and of the two first dorsal (without the epiphyses), are respectively 1.5, 1.3, 1.4, 1.5, 2, 2.25, and 2.5 inches. The width of the first dorsal vertebra across the transverse processes is exactly the same as that of the last cervical, 23"; the second is 3" less. The transverse processes of the posterior dorsal and of the lumbar vertebræ are very broad in the antero-posterior direction, and the spines are high. In the second lumbar vertebra, which is the largest, the extreme width is 40", and the height 29".

The ribs generally are slender, the first much shorter, broader, and flatter than any of the others. The vertebral end of this is split to the depth of about 6" into two flat broad plates, of which the anterior is slightly the longest; this brings their articular surfaces, when the rib is placed in its natural position (*i. e.* somewhat sloping backwards), exactly on a level, and proves that they must have articulated with the equal transverse processes of the seventh cervical and first dorsal vertebræ, and not with those of the latter and the second dorsal vertebra, which is  $1\frac{1}{2}$  inch shorter. This rib is  $32\frac{1}{2}$ " in length in a straight line,  $4\frac{1}{2}$ " wide at the middle, and 8" at the lower end; in thickness at the middle it is  $1''\cdot 2$ . Its general form closely resembles the figure given by Dr. Gray (P. Z. S. 1864, p. 224) from a specimen in the Museum of the Royal College of Surgeons, but it is rather broader in proportion to the length. The second, third, and fourth ribs have large articular heads and only slightly produced capitular processes. The second rib is 45" in length, the third 60", the fourth 61", the fifth  $62\frac{1}{2}$ ", the sixth  $61\frac{1}{2}$ ", the seventh  $61\frac{1}{4}$ ", the ninth 57", the twelfth 51", the thirteenth



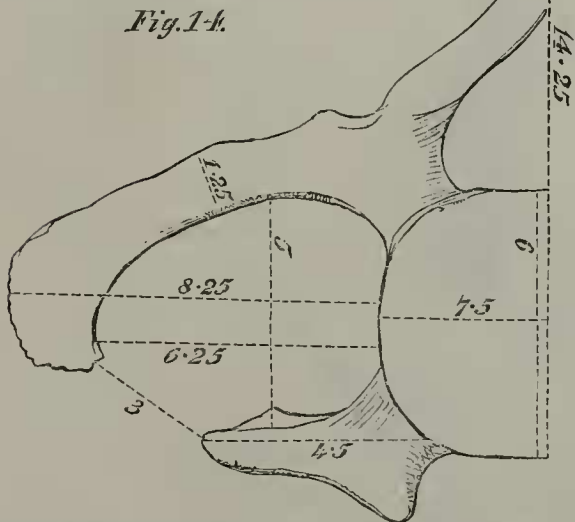
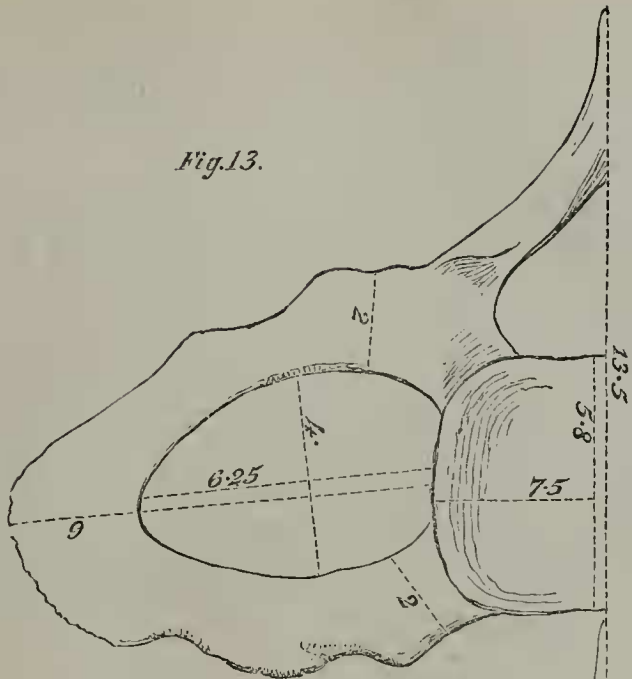


Fig. 13. Fifth cervical vertebra; anterior surface.  
14. Sixth cervical vertebra; anterior surface.  
15. The same; inferior surface.

49", and the fourteenth 48". They gradually decrease in breadth from the first. The last is considerably twisted on itself; it has a small, flat articular head, but there is no corresponding surface on the fourteenth dorsal vertebra, which is only slightly thicker at the extremity than the succeeding ones. On the thirteenth vertebra there is a distinct articular surface.

The sternum (fig. 8) is small, in the form of an irregular transversely elongated lozenge, the posterior angle being narrower and more produced, and the anterior more rounded, than in the Zuyder Zee specimen; so that it approaches more the form seen in the genus *Physalus*. Its length is  $8\frac{3}{4}$ ", and its breadth  $12\frac{3}{4}$ ".

The scapula is low and broad, with a long acromium and well-developed coracoid process. Its breadth is 40", its height  $22\frac{3}{4}$ "; the acromium 10" long, and 3" in depth; the coracoid 4"; the glenoid fossa  $8\frac{1}{2}$ " by  $5\frac{1}{2}$ ". The humerus is 15" long, by 6" in diameter in the middle of its shaft and  $7\frac{1}{2}$ " at the lower end. The radius is  $24\frac{1}{4}$ " long in a straight line, 4"·6 broad above, 3"·7 at the middle, and 5"·3 at the lower end. The ulna, which is 25" long, including the olecranon projection, is 7"·5 broad above, 2"·7 at the middle, and 4"·5 at the lower end. The thickness of the radius at the middle is 2"·2; that of the ulna 1"·8.

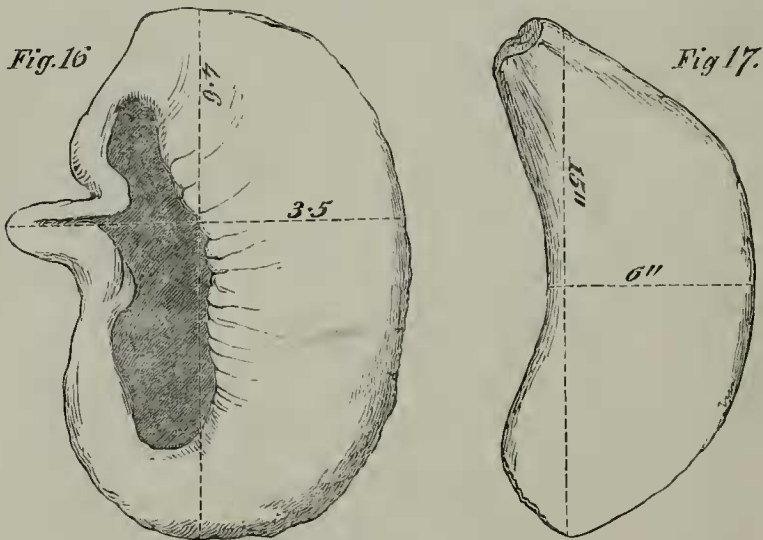


Fig. 16. Tympanic bone; half nat. size.  
17. One of the stylo-hyals.

The hyoid bone, formed of the completely united basi- and thyrohyals, is flatter and deeper from before backwards, and the lateral processes are smaller and more tapering, than in *Physalus*; but otherwise its general form is not dissimilar. Its extreme width in a straight line is 25"; its antero-posterior length  $10\frac{1}{2}$ ". The stylo-hyals (fig. 17) present a remarkable modification in form. Instead of the usual subcylindrical shape seen in *Physalus* and *Balaenoptera*, they are very broad and flat, and much curved, having a convex rounded

border and a concave thin edge, their flat surface having somewhat the form of a crescent with truncated ends, 15" long by 6" broad. Their greatest thickness at the convex border is about  $1\frac{1}{2}$ ". The ends are not alike, one being narrower and thicker, the other broader and flatter. The two bones are precisely similar.

Of the generic affinity of this Whale with the previously described specimen in the Leyden Museum from the Zuyder Zee, with Rudolphi's specimen at Berlin, and with the great Ostend Whale there can be no doubt. But is it specifically related to all or any of these? If this can be proved, the fact must have an important bearing on the distribution of the Fin-Whales, the coasts of European Holland and of its colony in the Indian Archipelago being as remote geographically and physically as almost any two spots upon the surface of the globe. Of course, to prove the absolute specific identity of two animals from the skeletons alone would be impossible. With only so much to found an opinion upon, all we can say, after having compared them bone by bone and found them agreeing in every particular, is that there is no proof of their being of different species, and that therefore, in the absence of other evidence, we are obliged to consider them as zoologically identical.

In the present case I have carefully compared the skeletons (that from Java and those from the European coast) together. I have even had the advantage of placing many of the bones of the two in the Leyden Museum side by side; and I confess that, allowing for difference of age, it is difficult to fix upon any characters in which they decidedly differ. The stylo-hyoids in the first, it may be said, are broader than in the Berlin or Brussels specimens, the sternum larger and of more definite cross-like form than in the Leyden skeleton, the transverse processes of the vertebræ are more developed and united at their ends than in either of these; but such characters are of no value for specific distinction. One, however, does appear to me of some importance; and that is the form of the orbital plate of the frontal, so decidedly narrower at the outer end in the Javan cranium than in the three specimens from Europe; but it is possible that even here age may cause the difference. Eschricht has laid great stress upon the little dependence that can be placed upon the proportions of the bones of the head in making out the specific characters of Whales. It is rather curious that the tympanic bones, though agreeing in general form, are actually smaller in the Java than in the Zuyder Zee skeleton, being less in length by  $0''\cdot3$ , and in breadth by nearly the same amount.

As I have said before, I cannot but regard this skeleton as having nearly attained its adult dimensions. Besides the special age-characteristics before pointed out, the general character of the vertebral column, especially the great development of the processes compared with the body of the bones, all indicate a condition approaching maturity. Whatever may be said, therefore, of the preceding specimen, I cannot identify the present one with the Ostend Whale: the difference of size alone appears to preclude it. Moreover, although a comparison of osteological details of the immature bones of the other specimens with those of the adult Ostend example was not

likely to throw much light upon the subject, here the case is different; and, as far as can be made out from the descriptions and drawings given by Dubar of that skeleton, there are notable differences, as in the form of the atlas, of the first rib, of the stylo-hyoid, in the statement that the second and three following ribs have heads reaching the bodies of the vertebræ, and in the statement that the transverse processes of the third, fourth, and fifth cervical vertebræ do not unite to form a complete hole as in the second, which last, however, would be of greater importance, if the figure did not throw some doubt upon its accuracy.

On the whole I have no hesitation in rejecting the name of *gigas* for this Java specimen, and, on account chiefly of its peculiar habitat, have some difficulty in placing it with *laticeps*. The question can only be definitely solved when far more is known of the habits and wanderings of the Cetacea than at present. The tendency of modern naturalists is decidedly to the idea that the geographical range of each species is much more strictly limited than was formerly supposed. Even Eschricht, who at one time strongly held the opposite opinion, and maintained that some species were cosmopolitan, was, as Prof. Van Beneden informs me, decidedly changing his views before his lamented death. We have, however, here an important alternative: either a species of Whale found in the North Sea, between the North Cape and the south coast of England, is found also on the coast of Java, without being known (at present at least) in any intermediate locality, or, on the other hand, in the specimen which I now bring before the notice of this Society we have a species new to science. As I know that the latter opinion will be adopted by many cetologists, I propose to call this specimen provisionally by the name of *schlegelii*, in honour of my distinguished friend, by whose influence the specimen has been made accessible to European naturalists, and who has himself made valuable contributions to this department of zoology\*.

The next specimen to be noted in the Leyden Museum is a skull of a very young Whale, of great interest as having also been brought from Java, by the late Dr. Reinwardt. It is labelled "*Balænoptera longimana*," and has in consequence been quoted in some of our most esteemed catalogues as evidence of the extensive geographical range of that species (Van Beneden, 'Faune Littorale de Belgique,' p. 38, and, after him, Gray, Proc. Zool. Soc. 1864, p. 208). The cranium is now in an extremely imperfect condition, the maxillaries, premaxillaries, and nasals being absent. There is, however, enough to show that it is not a *Megaptera*, but belongs to the subfamily *Balænopterinæ*, and probably, on account of the great width of the external part of the orbital process of the frontal bone, to the genus *Sibbaldius*. The lower jaw is 52" long, which would indicate an animal of about 18 feet, perhaps a young individual of the species last described.

\* Mr. Blyth (Journal of the Asiatic Society of Bengal, xxviii.) has noticed a Whale, said to have been 84 feet long, cast ashore on Juggu or Amherst Islet (lat. 19° N.) in 1851, and of which some bones are preserved in the museum at Calcutta, under the name of *Balænoptera indica*. The description of the coronoid process of the lower jaw indicates that it did not belong to the genus *Sibbaldius*, but was probably a *Physalus*.

Of *Balenoptera rostrata* there are two specimens, but neither of them yet articulated. The first is young and not very perfect; it formed part of the old anatomical collection of the University. The second and third cervical vertebræ are ankylosed by their arches; all the rest are free; the transverse processes are not fully developed.

The second is a fine perfect skeleton of an adolescent individual obtained more recently from the Norway coast. The cervical vertebræ are all free from each other; the upper and lower transverse processes fully developed; those of the axis and the sixth vertebra united together on both sides; the others all separate. A small tubercle represents the inferior transverse process on both sides of the body of the seventh vertebra.

The wealth of the collection of Cetacea in the Leyden Museum may be judged of when I mention that, in addition to the above, there are mounted skeletons of a very fine adult Hyperoodon, 23 feet long, a Grampus (*Orca gladiator*), two *Globiocephali*, a Beluga, two Narwhals, male and female, three examples of *Delphinus tursio*, eleven skeletons of smaller species of Dolphins, and a considerable series of skulls of members of this family.

In December 1841 a male Fin-Whale about 40 feet long was stranded at Katwijk-aan-Zee, six miles from Leyden. Dr. Schlegel gave a figure and description of its external characters, with some notes on its anatomy, in the second part of his 'Abhandlungen.' The skeleton passed into the hands of a person at Scheveningen, at which place it was for some time exhibited. As the rare opportunity here offered, of being able to connect a detailed and truthful account of the external appearance with the osteology of the same individual, I was highly desirous of making an examination of this specimen. It had been moved from Scheveningen; and it was not until after considerable trouble that I discovered the skeleton packed away in boxes in a store-room in the roof of a house at the Hagne. I was enabled, however, to make some notes, though circumstances did not permit a very careful examination. This is less to be regretted, as I trust that by this time it has been transferred to a more appropriate resting-place in the Leyden Museum.

The skeleton was evidently that of a very young individual of the genus *Physalus*, agreeing in every particular, as far as I could ascertain, with *P. antiquorum*. The bones were spongy, and the epiphyses on the limb-bones and vertebræ all non-united, even that on the hinder surface of the axis. The skull was about 9 feet long; the nasals were deeply excavated; the orbital process of the frontals narrowed at the extremity. The lower jaw had a considerable curve, and a long coronoid process. As mentioned by Schlegel, the vertebral formula was C. 7, D. 15, L. 14, C. 24=60. The form of the atlas and of the bodies of the cervical vertebræ were as in *Physalus* generally; the transverse processes were not developed, being in fact mere stumps. The upper and lower processes were not united even in the axis. The lower process of the fifth very short. Ribs, 15 pairs; the first with a simple head. Sternum small, undeveloped, with two broad lateral lobes at the anterior part, and a deep notch between

them on the front border; prolonged posteriorly into a handle-like process; its entire length was 9", its breadth 10". Scapula 20" in height, and 32" in breadth. Humerus 14" long. Radius 22" long.

In the magnificent private collection at Utrecht, formed by the late Professor Lidth de Jeude, is a fine skeleton of a Fin-Whale, of which, through the kindness of the Professor's widow, I had an opportunity of making a detailed examination. I could not learn either the time or place of its capture, except that it was obtained on the coast of Holland. It was from a young animal. The epiphyses were detached from both ends of the bodies of all the vertebræ between the axis and the last two or three of the tail; also from both ends of the humerus and bones of the forearm. The exoccipital, parietal, and squamosal bones were non-united; and moreover the processes of the vertebræ were imperfectly ossified, as shown by the condition of their ends, and their shortness compared with the large size of the bodies of the bones. It was more advanced, however, than the specimen examined at the Hague.

The length of the cranium is 9' 10"; of the vertebral column, the bones being placed close together, without the epiphyses, 31' 2"; to this must be added at least 5 feet for the thickness of the epiphyses and the intervertebral spaces; so that the whole animal could not have been much short of 50 feet in length. The number of vertebræ is C. 7, D. 15, remainder (of which 15 or 16 are lumbar) 42=64. The column is quite complete, and ends, not in an elongated bone composed of two or three centrums ankylosed, but in a small flat circular disk-like bone half an inch in diameter. The penultimate vertebra is simple, short, rounded at the edges, and about an inch in diameter. The one before this is much larger in every direction, increasing rapidly at its anterior end.

The cranium presents many of the characters before attributed to the genus *Physalus*, but with some peculiarities that I have not met with in any other specimen. The most remarkable of these is the great width of the rostrum, which, instead of gradually and steadily contracting from the base to the apex, as in *P. antiquorum* and the members of the genera *Sibbaldius* and *Balænoptera*, continues as far as the middle with very little diminution of width, so that the outer border is much more strongly convex in the anterior half. This is occasioned by the width of the maxillary bone, which more resembles that of *Megaptera longimana*. The great difference of the proportional breadth of the beak to the length of the cranium in this specimen, as compared with other Fin-Whales, is seen in the table at p. 399, and in the table of dimensions below. I may mention also that the breadth of the palatine surface of the maxillary, measured in a straight line, at the middle of the beak, is 16", whereas in the cranium of a Common Fin-Whale (*P. antiquorum*) in the Museum of the Royal College of Surgeons, of almost the same length (viz. 9' 3"), it is but 11½". The nasal bones are very broad and short, raised to a ridge in the middle line, and hollowed on each side on the upper surface and anterior border, though to a less extent than in the common species. The orbital plate of the frontal resembles

in its general form that of *Physalus antiquorum*, but is rather less narrowed externally. The lower jaw is massive, has a high, pointed coronoid process, and a considerable but not excessive curve.

*Dimensions (in inches) of Skulls of different examples of Physalus antiquorum and of the specimen at Utrecht.*

	Utrecht.	Antwerp Zoological Gardens.	Alexandra Park.	Louvain.	Young: Leyden.	Young: R. Coll. Surgeons.
Length of skull in straight line . . . . .	118	184	186	179	126	111
Breadth of condyles . . . . .	15	12	14	12	14 $\frac{1}{4}$	11 $\frac{1}{3}$
Breadth of exoccipitals . . . . .	36	56	55	54	39	38
Breadth of squamosals (greatest breadth of skull) . . . . .	60	96	86	78	60	56
Length of supraoccipital . . . . .	27	41	37 $\frac{1}{2}$	33	26	26
Length of articular process of squamosal. . . . .	28	36	34	35	25	24
Orbital process of frontal, length . . . . .	19 $\frac{1}{2}$	32	30	29	..	19
Orbital process of frontal, breadth at base* . . . . .	22	34	32	35	25	21
Orbital process of frontal, breadth at upper surface of outer end . . . . .	13	18	17	18	12 $\frac{1}{2}$	12 $\frac{1}{2}$
Nasals, length . . . . .	6 $\frac{1}{2}$	8 $\frac{1}{2}$	7	8 $\frac{1}{2}$	8 $\frac{1}{2}$	7
Nasals, breadth of the two, at posterior end . . . . .	5 $\frac{1}{4}$	6	4 $\frac{1}{2}$	3	4	3
Nasals, breadth of the two, at anterior end . . . . .	6	9 $\frac{1}{4}$	7 $\frac{1}{2}$	9	6 $\frac{1}{2}$	6
Length of beak † . . . . .	73	133	132	119	79	75
Length of maxillary . . . . .	86	145	142 $\frac{1}{2}$	137	86	87
Projection of maxillary beyond premaxil- lary . . . . .	5	9	10 $\frac{1}{2}$	8	9	..
Breadth of maxillaries at hinder end . . . . .	15	17	17	15	14	13
Breadth of maxillaries across orbital pro- cesses (following curve) . . . . .	64	89	88	84	60	57
Breadth of beak at base ‡ . . . . .	..	56	54	55	38	39
Breadth of beak one-quarter of its length from base . . . . .	..	45	45	42	..	30
Breadth of maxillary at the same point . . . . .	13 $\frac{1}{4}$	13 $\frac{1}{2}$	14 $\frac{1}{2}$	13 $\frac{1}{2}$	..	10
Breadth of premaxillary at the same point . . . . .	3	6	5	6	..	3 $\frac{1}{2}$
Breadth of beak at middle . . . . .	32	33	36	32	26	22 $\frac{1}{3}$
Breadth of maxillary at middle . . . . .	11	9 $\frac{1}{2}$	10	10	7 $\frac{1}{2}$	7 $\frac{1}{4}$
Breadth of premaxillary at middle . . . . .	4	5 $\frac{1}{2}$	6	5	4	3
Breadth of beak at three-quarters of its length from base . . . . .	22	18 $\frac{1}{2}$	23	21	..	13
Breadth of maxillary at same point . . . . .	5 $\frac{1}{2}$	5	5	4 $\frac{1}{2}$	..	3
Breadth of premaxillary at same point . . . . .	4 $\frac{1}{2}$	3 $\frac{1}{2}$	5	4 $\frac{1}{2}$	..	2 $\frac{1}{2}$
Length of lower jaw in a straight line . . . . .	112	180	177	..	..	112
Height at coronoid process . . . . .	18	21	23	..	..	15
Height at middle . . . . .	..	..	13	..	..	7 $\frac{3}{4}$
Amount of curve § . . . . .	11	..	24	..	..	15

In all the characters by which the atlas of *Physalus* differs from that of *Sibbaldius*, the present specimen agrees with the former.

\* From curved border of maxillary to hinder edge of orbital process of frontal.

† From curved border of maxillary to tip of beak.

‡ All the measurements across the beak include the curve of the upper surface.

§ Greatest distance of the inner surface of the jaw from a straight line drawn between the extremities.

The transverse processes are short, thick, and rounded, growing straight out of the upper half of the sides of the body of the bone, but, as said before, incomplete at their ends. It measures  $14\frac{1}{2}$ " in height, and 23" in extreme width; 16" across the articular surface for the skull, each facet being  $12\frac{1}{4}$ " in height and 6" in width; at their lower end these do not meet by a space of 2". The neural canal is 10" in height,  $5\frac{1}{4}$ " wide at the upper end, contracts rather above its middle to  $3\frac{1}{4}$ ", then expands somewhat again. The body of the axis measures 16" across and  $7\frac{1}{2}$ " in depth; with the processes, it is  $24\frac{1}{2}$ " wide and  $16\frac{1}{2}$ " high; the neural canal is  $6\frac{1}{4}$ " wide by  $5\frac{1}{2}$ " high. The upper and lower transverse processes do not completely unite, although they approach on one side within half an inch, on the other not quite so much; their extremities, however, are not ossified. The opening between them is regularly oval,  $4\frac{1}{4}$ " long and  $3\frac{1}{4}$ " wide.

The bodies of the remaining cervical vertebræ are rounded oblongs, their arches are low, and their spines little developed; the neural canals transversely elongated, and flattened above; from the third to the sixth, each has an upper and lower transverse process, the upper ones rising somewhat from the body of the vertebræ, before taking their outward and downward course, very thin, especially at their concave margin, gradually and very slightly decreasing in length. The lower processes somewhat shorter, and considerably broader, though thin; with a tuberosity on their under edge near the base; decreasing regularly in length, that of the sixth vertebra being notably shorter than the others. In the seventh vertebra the upper process is wider than in the others, and the lower one is reduced to a mere tubercle.

*Dimensions of the Cervical Vertebræ, in inches.*

	Extreme height.	Extreme width.	Height of body.	Width of body.	Height of neural canal.	Width of neural canal.
Third .....	14	23	8	13	$4\frac{3}{4}$	$6\frac{1}{2}$
Fourth .....	14	22	$8\frac{1}{4}$	$12\frac{1}{2}$	4	$6\frac{1}{2}$
Fifth .....	$14\frac{1}{4}$	22	$8\frac{1}{4}$	12	4	
Sixth .....	15	$21\frac{1}{2}$	$8\frac{1}{4}$	$11\frac{1}{2}$	$3\frac{1}{2}$	
Seventh .....	$15\frac{1}{2}$	22	$8\frac{1}{2}$	$11\frac{3}{4}$	$3\frac{1}{2}$	$7\frac{1}{4}$

There are 15 pairs of ribs. The first has an undivided head. The tuberosity is prominent but narrow, and a thin crest extends from it for some distance along the convex border of the rib. The greatest length in a straight line is 34"; the breadth at the middle 3", at the lower end 6". The second and third ribs have both well-developed capitular processes extending towards the bodies of the vertebræ, longer and more slender in the third. In the fourth this process is nearly obsolete, and absent in all the succeeding ones. There are rough surfaces on the infero-lateral portions of the hinder edges of the bodies of the first and second dorsal vertebræ, to which those processes of the ribs were connected, probably by the intervention of a strong ligament. The length of the second rib is 49"; of the third 59".



A bone which, from its general appearance, texture, and surface, I presume must be the sternum, especially as there was no other which could have represented this portion of the skeleton, presents most anomalous characters. It is very flat on both surfaces, a little more than 1" in thickness, of an irregularly oval form, being larger on one side than the other, and slightly produced at what I suppose would be the posterior border, and notched in the anterior. It is only  $5\frac{3}{4}$ " in its greatest diameter (transverse), and 4" in the other direction. Certainly the condition of the edges gave evidence of a bone incompletely ossified; but its very small size, especially in the antero-posterior direction, for a *Physalus* of the dimensions of the one under examination, is very remarkable.

The body of the hyoid I was unable to find; but the stylo-hyals are slightly curved, compressed, with a thick convex border, and a thinner concave border, rather larger at one end than the other; 14" in length,  $4\frac{1}{4}$ " in greatest width, and 2" in thickness—presenting, in fact, the usual form seen in the genus *Physalus*. The scapula and arm-bones had also the ordinary form: the former is 21" in height, and  $35\frac{1}{2}$ " in breadth; the acromium  $7\frac{1}{2}$ " long, and  $3\frac{1}{2}$ " in breadth; the coracoid  $2\frac{1}{2}$ " long; the glenoid fossa  $10\frac{1}{2}$ " by 7". The humerus is 17" long,  $7\frac{1}{2}$ " in longest diameter, and 20" in circumference at the middle. The radius is 27" long, 6" in breadth at the upper end,  $4\frac{3}{4}$ " at the middle and  $7\frac{1}{2}$ " below, and 3" thick at the middle. The ulna is 25" long, 7" across at the top,  $3\frac{1}{2}$ " at the middle (and 2" in thickness), and  $5\frac{1}{2}$ " at the lower end. The circumference of the two bones together at their middle is  $20\frac{3}{4}$ ". The metacarpal bones are long for the size of the animal, being respectively, beginning at the radial side, 6", 8",  $6\frac{1}{2}$ ", and  $4\frac{1}{4}$ "; whereas the same bones in the adult Common Fin-Whale in the Antwerp Zoological Gardens are  $4\frac{1}{2}$ ", 6", 6", and  $4\frac{1}{2}$ ", and in the specimen in the Alexandra Park  $4\frac{3}{4}$ ", 6", 5",  $3\frac{3}{4}$ ". The phalanges are long and rather different in number to those in the specimens of the Common Fin-Whale which I have examined, being 4, 5, 5, and 3 in the several digits, commencing on the radial side with No. II. In the Antwerp *Physalus* they are 2, 7, 6, and 3. But, as in both cases they have been artificially articulated, much importance cannot be attached to these numbers.

This skeleton differs in some respects from any other that I have seen, nor can I identify it with any published description sufficiently detailed for exact comparison. That it belongs to the genus *Physalus* as above defined there is little question. The only difficulty is in the form of the sternum. It must be remembered that the individual was young, and the bone, being slow of development, is subject to considerable variation in form during growth, and also, when fully grown, to great individual diversities of form. It scarcely seems advisable, therefore, on account of this one specimen to modify the generic diagnosis as regards this bone, though such a course might be necessary if a very small oval transversely elongated sternum were found characteristic of the adult animals belonging to the species. I think that there can be no question that this character, together

with the additional two caudal vertebræ, the wide maxillaries, the more elongated metacarpals, and the slight differences in the form of the cervical vertebræ and the ribs are sufficient to establish a well-marked species; and, unless it can be identified with any that has been previously described, I would suggest the name of *latirostris* as an appropriate designation.

In the Zoological Gardens at Antwerp is a very fine articulated skeleton of a male Common Fin-Whale (*Physeter antiquorum*, Gray), of which, with the courteous assistance of M. Vekemans, the Assistant Director of the establishment, I made a careful examination. The specimen has already been the subject of a paper by Professor Van Beneden, entitled "Sur une Baleine prise près de l'île Vlieland, et dont le squelette est monté au Jardin Royal de Zoologie d'Anvers" (Bull. Acad. Bruxelles, 2<sup>e</sup> sér. tome i. 1857, p. 390).

The skeleton is complete, with the exception of one of the pelvic bones, the tympanic bones, the last pair of ribs (probably), and one or two caudal vertebræ. As at present mounted, the intervertebral spaces appear to me too wide, especially in the cervical and caudal regions; and yet the skeleton measures in a straight line but 67' 6", viz. 15' 4" for the skull and 52' 2" for the vertebral column. The length of the animal is given by Van Beneden at 22 metres, or 72' 1". It exhibits all the signs of adult though not extreme age. All the epiphyses of the vertebræ are completely joined, as well as those of the humerus and the upper end of the radius and ulna. Those of the lower end of the last two bones are partially united. The upper border of the scapula is still incomplete towards the two extremities. The number of vertebræ is sixty-one, the last being modelled in wood; but from the character of the sixtieth I should say that there ought to be two behind it. Seven are cervical and fifteen dorsal, and, according to Van Beneden, fourteen or fifteen lumbar, though the place of attachment of the first chevron bone in the skeleton indicates but thirteen as belonging to this series. The characters of the atlas and the other cervical vertebræ are quite typical of the species; the upper and lower transverse processes, from the second to the sixth inclusive, are united to form complete rings. The breadth of the atlas is 25"; of the axis 44"; of the third 37". The aperture in the base of the great wing-like lateral process of the axis is 6½" long and 3" deep. The inferior process of the seventh is represented by a tubercle.

The cranium and lower jaw present little worthy of special notice, except that the articular processes of the squamosals are unusually developed laterally, giving great breadth to the posterior part of the head. The dimensions are given at p. 411. A circumstance that I have not observed in any other Whalebone Whale is that a considerable mass of bone of irregular form projects forwards from below the nasal bones in the trough of the vomer, to the extent of about two feet, only attached posteriorly. This is evidently an ossification developed in the ethmoidal cartilage.

There are fourteen pairs of ribs present; but as the fourteenth has not the characters usually met with in the last rib, and as the fifteenth

vertebra has the end of the transverse process thickened and showing traces of an articular surface, it is most probable, as Van Beneden supposes, that the fifteenth pair has been lost, and therefore that the skeleton, if complete, would present no exception to the normal number. The first rib is simple, 51'' in extreme length, and 13 $\frac{3}{4}$ '' in breadth at its lower end. The second and third have capitular processes which reach nearly to the bodies of the vertebræ; that of the second is rather the longest. There are corresponding rough tuberosities on the sides of the bodies of the first and second dorsal vertebræ. The neck becomes rudimentary in the fourth, and obsolete in the fifth and all succeeding ribs.

The sternum is trifoliate, differing from the one figured at p. 393 chiefly in having the posterior process shorter, broader at the base, and more tapering to the point. Its extreme length is 19'', and breadth 24''. The hyoid has the usual shape; its extreme breadth is 38'', and length 14''. The stylo-hyals are 19'' in length, and 5 $\frac{1}{2}$ '' in greatest breadth.

One pelvic bone is present, suspended on the left side; the other is modelled in wood. It is 15'' long and 3'' in greatest breadth, simple, straight, much compressed, slightly twisted on itself, broader generally at one end than the other, but pointed at both extremities. One edge is smooth and rounded, but furrowed by a deep linear groove; the other is irregularly tuberculated and spiculated. This form is quite different from that of the pelvic bones of the specimen in the Alexandra Park, where they are each 18 $\frac{1}{2}$ '' long, gently curved, flattened, quite smooth along the edges, and with a prominent angular projection from near the middle of the convex border.

The scapula is 31'' in height and 51'' in breadth; the acromium is 12'' long; the coracoid 5 $\frac{1}{2}$ ''. The humerus 19'' long, 9'' in greatest diameter, and 26 $\frac{1}{2}$ '' in girth at the middle. The radius is 32'' long, 7 $\frac{1}{2}$ '' in breadth at the upper and 9'' at the lower end. The ulna 36'' in extreme length, from the end of the olecranon, 30'' from the middle of its surface for articulating with the humerus, 10'' in breadth above and 6 $\frac{1}{2}$ '' below. There are six ossifications in each carpus. The phalanges appear complete: their number and the lengths of the metacarpals are given at p. 413. It should be stated that the latter are not very exact, as the ends of the bones are more or less concealed by the composition which replaces the cartilage. The baleen is present in both sides. The largest plates measure about 28'' in length.

The recent discovery of a large number of fossil remains of Cetaceans in the excavations occasioned by the fortification of the city of Antwerp has given a great impulse to the study of the osteology of the existing members of the order in Belgium; and, chiefly by the exertions of Professor Van Beneden of Louvain, a very fine collection has been brought together, in great part obtained from the Northern seas, through the co-operation of the late Professor Eschricht of Copenhagen. Many of the specimens enrich the admirable anatomical collection of the University of Louvain; but most of the larger ones have passed from the hands of M. Van Beneden to the Royal

Museum of Natural History at Brussels, where they are arranged and displayed to great advantage, under the able direction of M. Du Bus. Of this collection I shall speak first.

The first object that meets the eye on entering the room is a magnificent skeleton of *Balæna mysticetus*, the only one to be seen at present in any museum in Europe, except at Copenhagen. The singular effect produced by the enormous size of the head, as compared with the remainder of the skeleton, must be seen to be fully realized.

The cranium is 18' 9" long in a straight line, the vertebral column 31' 6", making a total of 50' 3". The epiphyses of the arm-bones are united at both ends, as are those of all the caudal vertebræ, but not those of the lumbar and dorsal vertebræ; so that the animal was in a late period of the adolescent stage. The vertebral formula is C. 7, D. 14, L. 10, C. 23=54. The tail is quite complete. This is the normal *total* number, according to Eschricht and Reinhardt; but an individual peculiarity consists in the development of an additional rudimentary rib on the left side, about 18" long, and articulating with the transverse process of the fourteenth vertebra behind the neck. This vertebra is therefore reckoned among the dorsal instead of the lumbar series. The ordinary number of dorsal vertebræ and pairs of ribs is thirteen. The two last lumbar and three first caudal vertebræ are enveloped in an immense mass of exostosed bone. The skeleton appears quite perfect; even the pelvic bones are present, though not yet articulated. There are two bones on each side, differing considerably in the details of their conformation from the same bones in the skeleton which has been lately received, though not yet mounted, at the Museum of the Royal College of Surgeons.

The osteology of the Northern Right Whale has been so fully described by Eschricht and Reinhardt that no further remarks upon this skeleton (which furnished part of the material for their memoir) are necessary.

*Megaptera longimana*.—A very fine and complete skeleton, 46' long, of a nearly adult individual. The vertebral formula is C. 7, D. 14, L. 11, C. 21=53. Ribs 14 pairs. The enormous size of the fins is grandly displayed in this specimen; they measure 12' from the head of the humerus to the tip of the phalanges. The cervical vertebræ are all free; the second to the fifth have the upper and lower transverse processes separate in all, but they are not complete at the ends. Those of the second are short, thick, and convergent, but still with a wide interval between their ends; this, according to Eschricht, is completed in the living animal by cartilage, which may in old age become ossified; but this process must take place at a relatively later period of life than in the *Balænopteriðæ*. According to the same excellent authority, the processes of the succeeding vertebræ are not continued in cartilage so far as to meet; so that we could never expect to find osseous rings on them. In the Brussels specimen the upper processes increase and the lower ones decrease in length, from the third to the fifth. There is no inferior process on the sixth or seventh.

*Sibbaldius*.—Of this genus there is a very interesting skeleton, almost the exact counterpart in size to that in the Leyden Museum. It was obtained by Eschricht from the North Cape. The condition of the epiphyses shows that it is young, they being all non-united both in the vertebral column and long bones; but the ossification of the transverse processes of the cervical vertebræ has proceeded further than in that at Leyden. The skeleton is well articulated, and gives now a total length of 31' 8"; but about 6" must be added for the end of the tail, which is wanting. The dimensions of the skull are given in the Table at p. 402. The nasals are narrow, cut off nearly straight at their anterior ends, slightly hollowed on each side above. The lachrymals are thickened at their outer edge. The orbital processes of the frontals broad externally. Lower jaw light, little curved, and with a short triangular coronoid process.

There are 7 cervical, 14 dorsal, and 32 lumbo-caudal vertebræ present; about 5 of the latter are absent, which would make a total of 58. The atlas has the usual characteristics of the genus. The transverse process of the axis forms a complete ring, the aperture of which has a length of  $2\frac{1}{2}$ " and height of 2". The whole process is  $5\frac{1}{2}$ " long, but is incomplete at the end; it is  $5\frac{1}{2}$ " in height at the middle, and the opening is situated much nearer the upper than the lower margin of the process. In the third vertebra also the upper and lower processes are united; in the fourth, fifth, and sixth they are separate. The lower one of the sixth is shortest, broad, and twisted on itself. In the seventh the inferior process is represented by a small tubercle.

There are 13 ribs present on the right side, and 14 on the left. The fourteenth is very much thinner than the others, twisted backwards at its lower end, with a very slender head, articulated to the transverse process of the vertebra. The first pair of ribs have double heads; but the anterior head on both sides is very incompletely developed, and on the right side completely detached from the remainder of the bone; it has a pointed end below, merely applied to the main part of the rib; so that if it had been lost in maceration, this rib might have been supposed to be simple. On the left side it is ankylosed, but very slender. It would be interesting to ascertain, by the examination of younger specimens, whether this anterior head has always a separate centre of ossification, as it is not improbable that this singular double-headed bone is in reality formed by the coalescence of two originally distinct ribs. The second, third, and fourth ribs have small capitular processes. The stylo-hyals are very flat, but not so broad proportionately as in the Java Whale, being 11" long and  $3\frac{1}{2}$ " in greatest width. The bones of the fore limbs present the same general characters and proportions as in the Leyden specimen from the Zuyder Zee. The sternum is absent.

This specimen has been previously mentioned in this paper as an example of *Sibbaldius laticeps*, Gray, presenting some interesting individual deviations from that at Leyden, referable to the development of the two skeletons not having proceeded *pari passu* in all parts of the system.

Of the Lesser Fin-Whale (*Balænoptera rostrata*) there are two skeletons—the first a very beautiful and perfect specimen, from the same locality as the last-mentioned skeleton. The baleen is *in situ* on both sides of the mouth, never having been removed. The animal was in the adolescent stage. The epiphyses of the upper end of the radius and ulna are united, but that of the head of the humerus is still separable. The entire length is 23' 2", of which the head occupies 5' 2". The vertebral formula is C. 7, D. 11, L. 12, C. 17=47; but one or more bones are wanting from the end of the tail. The cervical vertebræ are all free. The upper and lower transverse processes of the sixth are united on the right side, but separate on the left.

The other skeleton of the same species is rather larger, but not so complete. The cervical vertebræ are all free, and none of the transverse processes (excepting those of the second) are united at their ends.

The second division of the Cetacea (the *Delphinoidea*) is represented in the Brussels Museum by two skeletons of *Hyperoodon* (one nearly adult, 23' long, with two small sharp teeth at the extremity of the lower jaw, and the other young), the unique skeleton of *Mesoplodon sowerbiensis* (described by Du Mortier and afterwards by Van Beneden), *Orca gladiator* (an adult and young), *Globiocephalus vineval* (adult), *Beluga leucas*, *Monodon monoceros*, and five examples of the genus *Delphinus*.

The resources of the museum of the University of Louvain being, of course, not equal to those of a national establishment, its collection of Cetacean skeletons, though illustrative of most of the principal types, and all in excellent condition, is necessarily limited to individuals of moderate dimensions. Hence the *Balænoidea* are not so well represented as the *Delphinoidea*; and, as they all belong to well-known species, few notes will be sufficient.

*Eubalæna australis*? (Cape Whale).—Imperfect skull, 8' 4" long, of a young individual.

*Megaptera longimana*.—Complete skeleton of young, 32' 2" long, of which the head is 8' 6". Vertebræ, C. 7, D. 14, L. and C. 31=52. Ribs 14 pairs. Sternum with a very deep notch in the middle of the upper border. Upper and lower transverse processes of the axis further apart at the ends than in the Brussels specimen. Upper processes of the third, fourth, fifth, and sixth slender, almost straight, and of nearly equal length. Lower processes much shorter, and gradually diminishing from the third to the sixth; absent in the seventh.

*Physalus antiquorum*.—A fine cranium from the Jutland coast, about 15' in length. It is rather narrow posteriorly in proportion to its length; and the nasal bones, though of the general form characteristic of the genus, are very narrow, and pointed at their hinder ends.

*Balænoptera rostrata*.—Skeleton of a young individual, marked *B. minima*, and said to belong to a small variety only found among the Right Whales of Greenland. The total length is 17' 3"; but several vertebræ are wanting from the end of the tail. The skull is 4' long. There are 7 cervical, 11 dorsal, and 12 lumbar vertebræ, and 11 pairs of ribs. The cervical vertebræ are all free, and the

upper and lower transverse processes are not united at their ends in any of them; but in the axis the union is almost complete.

There is also a skull, 3' 8" long, of a younger specimen of this species.

The skeletons of the *Delphinoidea* include a very fine perfect adult *Hyperoodon rostratum*, 24' 4" long, of which the cranium is 5' 4". The vertebral formula is C. 7, D. 9, L. 8, C. 20=44. Ribs 9 pairs. One of the sharp-pointed teeth is left *in situ* at the end of the lower jaw, nearly covered by the dried gum. Also *Orca gladiator* (adult), *Globiocephalus svineval* (two adult and one foetal), *Lagenorhynchus albirostris*, *Delphinus eschrichtii* and *D. guianensis* (Van Beneden, Mém. de l'Acad. Roy., coll. in-8vo., tome xvi., figure), *Beluga leucas*, *Monodon monoceros*, and *Phocæna communis*. Of the last-named there are several specimens, including two beautifully prepared foetal skeletons. Among the collection of crania is the unique *Ziphius indicus*, Van Beneden (Mém. de l'Acad. Roy., coll. in-8vo., tome xvi., figure).

In conclusion, it may be useful to put down a list of the different species above noted, arranged systematically, with an indication of the collections in which they are contained.

#### Suborder BALENOIDEA.

*Balæna mysticetus*.—Skeleton, Brussels. Skull, Leyden.

*Eubalæna australis*?—Skeleton, Leyden. Skull, Leyden. Skull, Louvain.

*Megaptera longimana*.—Skeleton, Leyden. Skeleton, Brussels. Skeleton, Louvain.

*Physalus antiquorum*.—Skeleton, Antwerp. Skeleton, The Hague. Skull, Leyden. Skull, Louvain.

*Physalus latirostris*.—Skeleton, Utrecht.

*Sibbaldius laticeps*.—Skeleton, Leyden. Skeleton, Brussels.

*Sibbaldius schlegelii*.—Skeleton, Leyden.

*Balænoptera rostrata*.—Skeletons (two), Leyden. Skeletons (two), Brussels. Skeleton and skull, Louvain.

#### DELPHINOIDEA.

*Hyperoodon rostratum*.—Skeleton, Leyden. Skeletons (two), Brussels. Skeleton, Louvain.

*Mesoplodon sowerbiensis*.—Skeleton, Brussels.

*Ziphius indicus*.—Skull, Louvain.

*Globiocephalus svineval*.—Skeletons (two), Leyden. Skeleton, Brussels. Skeletons (two adult and one young), Louvain.

*Orca gladiator*.—Skeletons, Leyden, Brussels (two adult and young), Louvain.

(Specimens of the genera *Delphinus*, *Lagenorhynchus* and *Phocæna* not always noted.)

*Beluga leucas*.—Skeletons, Leyden, Brussels, Louvain.

*Monodon monoceros*.—Skeletons, Leyden (male and female), Brussels, Louvain.

It is remarkable that, in all these fine collections, that genus of

gigantic Delphinoids, *Catodon* or Sperm-Whale, is represented only by an atlas, and the lower jaw of a very young individual, at Leyden, and, if I remember rightly, an atlas at Brussels. There is, however, in a church at Scheveningen, in Holland, a skull, in a very imperfect condition, of one of these animals, washed ashore near that place in the year 1617.

2. ON A NEW SPECIES OF GRAMPUS (*ORCA MERIDIONALIS*) FROM TASMANIA. BY WILLIAM HENRY FLOWER, F.R.S., F.R.C.S., ETC., CONSERVATOR OF THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

The Museum of the Royal College of Surgeons has lately received from Mr. W. L. Crowther, of Hobart Town, two skulls belonging to an animal there called "Blackfish," a term, it may be remarked, which has been applied by sailors to many different species of Cetaceans. On showing them to Dr. Gray, whose extensive experience in regard to this order is well known, he immediately pronounced them to belong to a species unknown to him. At the same time he pointed out their resemblance to the skull found in a semifossil state in Lincolnshire, described and figured by Professor Owen under the name of *Phocæna crassidens*\*, to which species Professor Reinhardt of Copenhagen has recently referred a Cetacean still existing in the North Sea†. I have since had an opportunity of examining the extensive collections of skeletons and crania of Cetacea in the Museums of Leyden, Louvain, and Brussels, and have not found in them any similar specimen.

In reply to some queries respecting the animal from which the skulls were obtained, which I addressed to my esteemed correspondent Mr. Crowther (who, besides being one of the leading medical practitioners in the colony, is also the owner of several whaling-vessels), that gentleman writes as follows:—

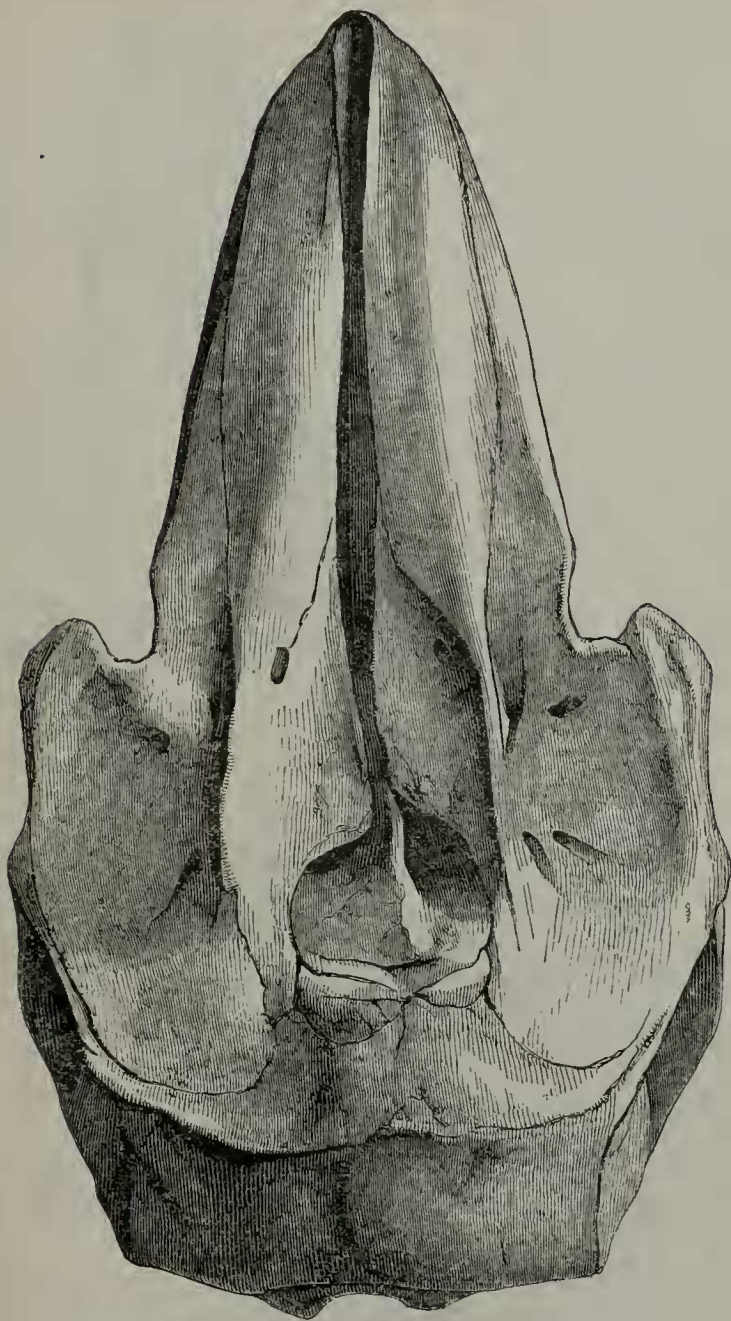
"'Blackfish.'—This fish is in reality a miniature Sperm-Whale in its habits, &c., feeding upon the same food ('squid'), geographically occupying the same localities as the Sperm-Whale, following the great equatorial currents so long as they retain their warmth, and met with in the greatest numbers in the southern hemisphere at those points where the equatorial meet the polar currents, eddies being formed in which no doubt the squid collects. I am not aware that the Blackfish preys upon anything but squid; it is essentially gregarious, countless hordes being met with where food is abundant. Length 12 to 15 feet; diameter 3 to 4 feet. Colour, black on the back and sides, lighter below. Males much larger than the females. Head obtuse, after the fashion of the Sperm-Whale. Pectoral fins small. Dorsal fin hook-shaped, and situated about two-thirds along the body towards the tail. Weight two to three tons, the former about the average. Oil, the only kind that will mix with sperm."

\* A History of British Fossil Mammals and Birds: 1846, p. 516.

† "Pseudorca crassidens, et for den Danske fauna nyt Hvaldyr" (Særskilt Aftryk af Oversigten over d. K. D. Vid. Selsk. Forhandl. Nov. 1862).



Fig. 1.



Upper surface of the adult skull; one-fourth natural size.

The two skulls present considerable individual peculiarities; but these all arise, I believe, from difference of age. One is perfectly adult; the suture between the frontal and occipital bones is entirely obliterated; the upper ends of the maxillaries are ankylosed to the

frontal; the teeth, though pointed at the tips, have a polished surface, and many of them are worn at the sides by the mutual action upon each other of the upper and lower series. In the other skull the ossification of the sutures is less advanced; the teeth show no signs of wear, and have a uniform slightly rugous or granulated surface. This skull differs from the other, as will be more particularly shown by the measurements, in having the facial portion and all the ridges and outgrowths of the cranium for the attachment of muscles much less developed in proportion to the size of the cerebral cavity. In all essential specific characters they agree. Unless otherwise expressed, the description and comparisons which follow refer to the adult skull.

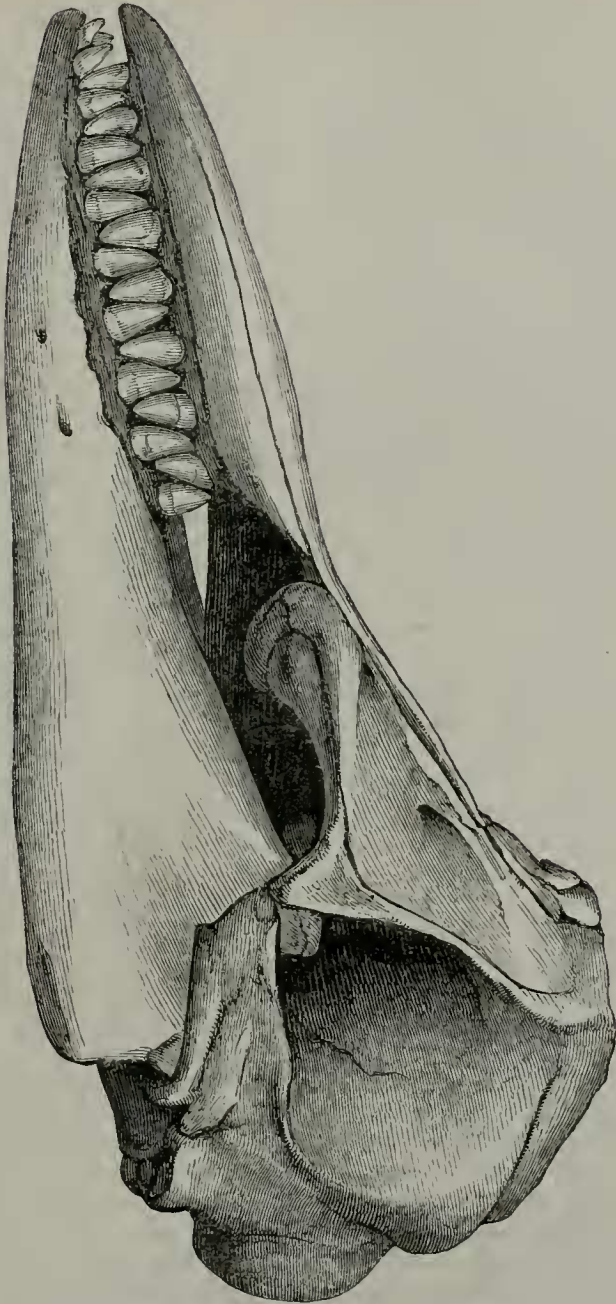
The skulls correspond in their general characters with those of the genus *Orca*, as established by Gray\*. The "teeth conical, acute, large, occupying the whole edge nearly to the notch, permanent," sharply differentiates them from all allied genera; but the definition of *Orca*, as far as it relates to the intermaxillaries "being one-half the width of the jaw-bones," would not include them. Reinhardt has raised *O. crassidens* to the rank of a genus, under the name of *Pseudorca*; and to this section our present skulls undoubtedly belong, though by a slight extension of the definition of the parent genus they might conveniently be included in it. The true affinities of the animal, however, cannot be satisfactorily decided without an examination of the characters of the remainder of the skeleton, which, with Mr. Crowther's assistance, I hope before long to be able to make.

The principal dimensions of the two skulls are as follows:—

	Adult.	Young.
	in.	in.
Length from tip of beak to condyles .....	23 $\frac{1}{4}$	20 $\frac{1}{4}$
Internal length of brain-cavity .....	7 $\frac{1}{2}$	7
Length of beak (from a line drawn between the maxillary notches, to the tip) .....	11 $\frac{1}{4}$	9 $\frac{1}{2}$
Length from tip of beak to anterior margin of superior nares ..	14 $\frac{1}{4}$	12
Length of palate (from tip of beak to posterior margin in middle line) .....	15	12 $\frac{3}{4}$
Length from tip of beak to hinder edge of posterior tooth ...	9 $\frac{1}{4}$	8 $\frac{1}{4}$
Height of skull at vertex .....	8 $\frac{3}{4}$	8 $\frac{1}{2}$
Greatest breadth (at zygomatic processes of squamosals) .....	13	11
Breadth of brain-case in parietal region .....	9 $\frac{1}{2}$	9 $\frac{3}{4}$
Breadth at supraorbital ridge .....	11 $\frac{3}{4}$	10
Breadth of the base of the beak, inside maxillary notch .....	7 $\frac{1}{4}$	6 $\frac{1}{4}$
Breadth of the middle of the beak .....	5 $\frac{3}{4}$	5 $\frac{1}{4}$
Breadth of the two premaxillaries, with their intervening space at the middle of the beak .....	4 $\frac{1}{2}$	3 $\frac{3}{4}$
Width of condyles .....	5 $\frac{3}{4}$	4 $\frac{3}{4}$
Foramen magnum, height .....	2 $\frac{1}{4}$	
Foramen magnum, width .....	2 $\frac{1}{2}$	2
Lower jaw, entire length of each ramus .....	19	16 $\frac{1}{4}$
Lower jaw, from tip to the posterior edge of last tooth .....	9 $\frac{3}{4}$	8 $\frac{1}{4}$
Length of symphysis .....	3 $\frac{1}{2}$	2 $\frac{1}{2}$
Height of ramus, at coronoid process .....	5	4
Width, posteriorly, between outside of articular surfaces .....	12 $\frac{1}{4}$	10 $\frac{1}{4}$

\* Zool. Erebus and Terror: 1846. Cat. Cetacea Brit. Mus.: 1850.

Fig. 2.



Side view of the adult skull; one-fourth natural size.

The teeth are nearly circular in section, stout, conical, pointed, incurved, and very slightly recurved. The crowns of the largest measure 1·2 inch in length, and 0·65 inch in diameter at the base.

With the exception of the two anterior and the posterior, they are of very nearly equal size throughout. Their number is the same in both skulls, viz. eight on each side above, and ten below; but though the whole number is the same, I suspect that it is not exactly the corresponding teeth which are in place in both specimens, at all events as far as the upper jaw is concerned. By comparing tooth with tooth, especially as regards their position in the alveolar margin, the older specimen would appear to have lost the small anterior pair present in the younger one; while in the latter the posterior pair appear not yet to have been developed. It must be confessed that our knowledge of the growth and succession of these organs in the Cetacea is at present so imperfect that we ought not to lay much stress upon any trifling variations in their number or character in discriminating species.

The only other species of *Orca* from the southern hemisphere hitherto known is *O. capensis*, Gray, an animal closely allied to, indeed by some naturalists thought to be identical with *O. gladiator*, the common Killer or Grampus of our seas. The principal differences between the Tasmanian skull and that of *O. capensis* are the following:—Its size is much smaller, measuring in entire length but 23 instead of 38 inches. The brain-cavity is relatively very much larger, and the outer surface of the cranium comparatively smooth. In *O. capensis* the ridges for the attachment of the muscles are enormously developed, and conceal the form of the brain-case. These differences, being those that are found between young and old individuals of the same species, might at first sight give rise to the idea that such a relationship existed between the two skulls under comparison, were it not for the signs of maturity possessed by the smaller skull, and did we not also know that a similar relation exists between the small and large species of all natural groups. But, in addition to these, in the Tasmanian skull the nasals are larger, and the prefrontal does not rise in front of them to the vertex of the head, as in *O. capensis*. A great difference is also seen in the form of the premaxillaries: in the new specimen these bones are widest at the middle of the beak, their outer border at this part being convex, approaching in the amount of their encroachment upon the maxillaries those of the genera *Grampus* and *Globiocephalus*; while in the large Cape species they are very narrow at the middle of the beak, and dilate towards their anterior termination, the outer border being concave. The form of the palate is generally the same; but it is rather more contracted behind the last tooth, and the tooth-line is rather less curved, than in *O. capensis*. The teeth are fewer in number, more regularly conical, less compressed in the antero-posterior direction. In the lower jaw the symphysis is proportionately longer, more shallow and sloping. As *O. gladiator* agrees with *O. capensis* in all the above-named points, the present species is distinctly differentiated by its cranial characteristics from the two large members of the genus.

In the 'Zoology of the Erebus and Terror,' Dr. Gray has figured and described a skull (in the British Museum, locality unknown)

under the name of *Orca intermedia*. This is evidently that of a very young individual, probably of one of the above-mentioned large species. At all events the number of the teeth ( $\frac{11}{11}$ ) and the form of the premaxillaries distinguish it from the Tasmanian skulls.

To find distinctive characters to separate the present species from *O. crassidens* is a matter of greater difficulty. I speak of the animal now existing in the northern seas, which Reinhardt has fully described in an illustrated memoir in the Danish language, and which he believes to be identical with the Lincolnshire specimen. Not having yet been able to get a translation of Professor Reinhardt's paper, I cannot make so good a comparison as is desirable, though the figures which he gives to a great extent supply the deficiency. In the first place I must remark that the *O. crassidens* is of very rare occurrence in the northern seas, having been only recently added to the Scandinavian fauna. Our "Blackfish," on the other hand, appears to be the most abundant of the Cetacea inhabiting the seas around Tasmania. It is possible that, being a warm-water animal, it may occasionally cross the line and stray into northern latitudes; but the belief is gaining ground among naturalists who have specially investigated the Cetacea, that the geographical range of the different species of the order is much more limited than at one time supposed.

Professor Reinhardt's figure of the external form of his specimen differs widely from Mr. Crowther's description, the dorsal fin being situated rather anterior to the middle of the back, and the head being small and flat, certainly offering no peculiarity which could cause it to be compared to the Sperm-Whale by men practically acquainted with the distinctive characters of these animals. In size the skulls nearly correspond, the two of which Reinhardt gives the dimensions being each 24.7 English inches long. In general characters also, in the proportions which the beak bears to the rest of the skull, and in the breadth of the intermaxillaries, they agree very closely. A minuter inspection, however, shows differences which, presuming Professor Reinhardt's figure to be correct, could scarcely be found among individuals of the same species. The Tasmanian skull is narrower in proportion to the length, the beak is much more pointed at the extremity, and the premaxillaries are of different form. In *Pseudorca crassidens* they are of nearly equal breadth from one end to the other, their outer margins being almost parallel; in the Tasmanian skulls they are contracted at the root of the beak, and then gradually expand to about the middle, beyond which they slowly diminish in breadth to the point. An examination of the skulls placed side by side might possibly reveal other differentiating characters; but I think that these are sufficient, together with the great improbability of the same species being found in such widely different regions, to justify my regarding the small Grampus from Tasmania, however familiar to the inhabitants of that country, as a species new to zoological literature, and imposing upon it the name of *Orca* (*Pseudorca*?) *meridionalis*. Probably, as in the case of some other

genera of Cetacea, we have here representative species, one in the northern and the other in the southern hemisphere; but if hereafter they should prove to be identical, the main habitat of the animal is undoubtedly in the temperate seas of the further side of the equator.

### 3. REPORT ON THE BIRDS OF PALESTINE.

By H. B. TRISTRAM, M.A., F.L.S.

#### 1. GYPAËTOS BARBATUS (L.).

A few pairs may be seen in almost every part of the country. The Lammergeyer is, however, nowhere common, though more plentiful on the eastern than on the western side of Jordan.

#### 2. VULTUR MONACHUS, L.

Rarely have I had an opportunity of identifying this magnificent Vulture, which occurs, not in flocks, but only, so far as we could observe, in pairs, throughout the country. It does not appear to breed in society; and the only nest we took was solitary in a cliff facing the Lake of Galilee, where my friend Mr. Shepherd climbed and took the single egg on February 27th, the bird having remained on her nest till we were within 6 feet of her.

#### 3. GYPS FULVUS, Gm.

Very common and a permanent resident from the south end of the Dead Sea up to the spurs of the Lebanon, among which mountains we rarely observed it. Breeds in many places in large colonies. We counted more than 120 birds together, put off their nests by the firing of our guns, in a single wady. It is more plentiful in the north than in the south, doubtless for reasons of commissariat, but everywhere is sociable; we never observed so few as a single pair in any locality. It breeds, as in Africa, in the beginning of March.

#### 4. NEOPHRON PERCNOPTERUS, L.

Universally diffused over the whole country in summer, but never seen in winter. It does not breed, like the Griffon, in colonies, but is scattered abundantly and almost equally over all parts of the country. It returns from the south about the end of March. The first we shot was obtained on April 4th. The nests are generally in the lower parts of the cliffs, and not very difficult of access, in this respect differing very decidedly from the Griffon's. The first egg we obtained was on April 1st, and the last *fresh* eggs found were on May 24th. Several birds in the dark immature plumage were seen in April, evidently not having paired, and proving that the white plumage is not attained until the third year.

#### 5. AQUILA CHRYSÆTOS, L.

Not so common in summer as in winter, when it is found abun-

dant on all the maritime plains. It appears to retire to the northern mountains to breed.

6. *AQUILA HELIACA*, Sav.

We frequently saw the Imperial Eagle. On one occasion in the early morning, in the valley of Dothan, a bird slowly passed close to us, the most magnificent specimen I ever saw, with its white scapulars splendidly distinct. We did not succeed in finding its nest; but it remains throughout the year. I had a specimen given me in Beyrout in the immature plumage, in which it has been described as *A. bifasciata*.

7. *AQUILA NÆVIA*, Br.

Not uncommon, especially in winter. A specimen, which I showed to Mr. Gurney, that gentleman pronounced to be the large variety called *A. clanga* by Pallas.

8. *AQUILA NÆVIOÏDES*, Cuv.

Frequent throughout the year.

9. *AQUILA BONELLII* (Temm.).

Common at all seasons, but restricted more than the preceding to the hills and wooded districts.

10. *AQUILA PENNATA* (Gm.).

One of the first birds of prey we noted on the Lebanon in November. Seen occasionally throughout the year, but only in the north. Mr. Upcher obtained a specimen in March on the Lebanon.

11. *PANDION HALIAËTUS*, L.

Noticed frequently at all times of the year on Mount Carmel and near the Kishon.

12. *CIRCAËTOS GALLICUS*, Gm.

Beyond all doubt the most abundant of all the Eagles in Palestine, at least in spring. I am not sure that I ever saw it but once in winter; and that was in the sheltered groves of Sidon. From the beginning of March we met with it everywhere. It is rather a late breeder for an Eagle, as we found its eggs quite fresh at the end of April. We never found more than a single egg in each nest. The male bird appears to incubate by turns with the female.

13. *BUTEO VULGARIS*, Bechst.

Common in winter on the plains. Not observed in spring.

14. *BUTEO RUFINUS*, Rüpp.

Extremely numerous in every part of the country and at all times of the year. In winter it congregates in small flocks over the plains of Judæa, but during the breeding-season is segregated in pairs in

the wooded wadys. We have found the nests both in rocks and trees, generally the former. Three is the ordinary complement of eggs in a nest. I took the first nest on Mount Carmel on March 22nd, and the last we found with fresh eggs was on May 1st.

15. *PERNIS APIVORUS*, L.

In the wooded portions of the country. A permanent resident. Observed near Tyre in November, and shot by Mr. E. Bartlett near Nazareth in April.

16. *MILVUS REGALIS*, Br.

The Red Kite is universally distributed in winter, but retires in early spring from the southern deserts to the ravines of Lebanon and Gilcad to breed.

17. *MILVUS ATER*, Gm.

A migrant. Returns in immense numbers about the beginning of March, and builds generally in trees about the villages, and occasionally in the glens and among the rocks.

18. *MILVUS PARASITICUS*, Daud.

Of the same habits as the preceding, and almost equally abundant. Perhaps rather less familiar, and preferring the wadys to the villages. A late breeder, having eggs unhatched at the end of May.

19. *ELANUS MELANOPTERUS*, Daud.

Not common. A summer visitant.

20. *FALCO PEREGRINUS*, L.

A constant resident on the coast and on the western slopes of the hill-country of Judæa, Samaria, and Galilee. Not observed in the Jordan valley, nor in the east. A female was shot, while incubating, at Jaffa in the beginning of March.

21. *FALCO LANARIUS*, Schl.

Takes the place of the preceding in the whole interior, where it is universally distributed. A nest of four eggs taken near Jericho in the cliffs on February 29th. We never saw the Lanner and Peregrine in the same districts. The Lanner is trained by the great sheiks of the east of Jordan for falconry.

22. *FALCO SACER*, Schl.

This noble and unmistakable bird only came under my observation in the oak-forests of Bashan. It seems to prefer the wide plains and deserts to the cliffs of the Jordan valley.

23. *FALCO ELEONORÆ*, Gené.

Several times noted in spring, but not in winter. Breeds in the wooded portions of Cœle-Syria.



24. *FALCO SUBBUTEO*, L.

A migrant. Rare in the south; more common in spring in the wooded districts of Galilee.

25. *FALCO ÆSALON*, Gm.

Apparently only a winter visitant. Shot both in the east and west; but not observed after March.

26. *ERYTHROPUS VESPERTINUS* (L.).

Another summer visitant to Palestine, but scarce.

27. *TINNUNCULUS ALAUDARIUS*, Br.

Everywhere common, excepting in the southern wilderness, and a constant resident.

28. *TINNUNCULUS CENCHRIS*, Naum.

A migrant, returning in the beginning of March, and building in colonies in old ruins and in caves. Very common.

29. *ASTUR PALUMBARIUS* (L.).

I never observed the Goshawk myself, but saw a skin in the possession of an Italian gentleman at Beyrout, who had purchased the bird in the flesh in the market.

30. *ACCIPITER NISUS* (L.).

Rather plentiful in winter. We never found its nest, nor did we meet with it in spring.

31. *ACCIPITER SPHENURUS*, Rüpp.

We obtained two specimens in Galilee in April and May. It appears to take the place of the Sparrow-hawk at that time, and probably returns from the south, while its congener retires to the north.

32. *CIRCUS ÆRUGINOSUS* (L.).

Very common throughout the year on all the plains.

33. *CIRCUS CYANEUS* (L.).

A permanent resident.

34. *CIRCUS CINERASCENS*, Montagu.

Obtained on the Plain of Gennesaret.

35. *CIRCUS PALLIDUS*, Sykes.

Rather more common than the preceding. Frequents the marshes under Mount Carmel.

N.B. In my article on the Birds of Palestine (*Ibis*, 1859, p. 26) I inserted as observed, but not obtained, *Micronisus gabar*, believing that I had satisfactorily identified it. I think I was probably mistaken; at least we never met with it during this expedition.

36. *ATHENE MERIDIONALIS*, Risso.

An abundant and resident species in every part of the country.

37. *KETUPA CEYLONENSIS*, Gm.

This extraordinary and most interesting addition to the fauna of Palestine was shot by me in a wild wooded glen running down into the Plain of Acre, the Wady el Kurn. We put up out of trees at least four individuals in two days. The wady possesses a perennial and well-shaded stream, which swarms with fish and crabs, the favourite and perhaps exclusive food of this Owl. I obtained my specimen on December 8th.

38. *SCOPS ZORCA*, Gm.

Very common in spring in old ruins and olive-groves, returning to Palestine about the middle of April. We found the nests both in walls and in hollow trees.

39. *BUBO ASCALAPHUS*, Sav.

A resident and widely distributed species, living in burrows in the rolling uplands of Beersheba and in caves in the deep glens of Galilee.

40. *OTUS VULGARIS*, Flem.

Rather scarce.

41. *OTUS BRACHYOTUS*, Boie.

Occurs in winter in the north and on the hill-country of the south.

42. *SYRNIUM ALUCO* (L.).

Common wherever there is timber. Frequently heard in Gilead, where I took the nest; obtained by Mr. Herschell near Jericho; and very numerous about the cedars of Lebanon.

43. *STRIX FLAMMEA*, L.

Met with by me during my first visit; but not observed in the course of our recent researches.

44. *CAPRIMULGUS EUROPÆUS*, L.

A summer visitant. Has been obtained by various travellers in every part of the country.

(*Caprimulgus ruficollis*, Temm. I saw a specimen in the possession of a Greek at Jerusalem, who assured me he had bought it in the flesh there; but I have no further authority for its insertion.)

45. *CAPRIMULGUS TAMARICIS*, n. sp., mihi, P. Z. S. 1864, p. 170.

This interesting species appears to be a permanent resident in the Dead Sea basin, where alone, in the most desolate and unfrequented parts, we obtained it in the month of January, at Air Feshkbah, in the north-west, and Jebel Usdum, at the south end. In form and size

it is intermediate between *C. asiaticus* and *C. albonotatus*, but in coloration is very distinct from any species with which I am acquainted.

46. *CYPSELUS MELBA*, L.

One of the earliest migrants from the south in spring. At day-break, on February 12th, we noticed large flocks passing rapidly over our tents near Jerusalem in a northerly direction. It breeds in colonies, in caves and inaccessible fissures, through the whole country, especially in the Jordan valley and the surrounding wadys.

47. *CYPSELUS APUS*, L.

Returns from the south much later than its congener. Swarms in myriads about all the towns, but not very common in the lonely ravines. We did not observe it till the first week in April. It ascends higher than *C. melba*; and when we were on the top of Hermon, numbers of the common Swift were sporting overhead almost out of sight.

48. *CYPSELUS GALILÆENSIS*, Antinori.

A permanent resident in the "Ghor" or Jordan valley, in the neighbourhood of which alone it is found. Although it feeds on the wing indiscriminately in company with its two congeners, it is very distinct in its habits. Its note is peculiar—a gentle and melodious wail of three semitones, sharply repeated when alarmed. It breeds in colonies, and has laid its eggs when *C. melba* arrives, and hatched its young before the return of *C. apus*. The nest is most peculiar, under an overhanging cliff, generally at a height of from 30 to 400 feet above any accessible stand-point. The nests are clustered side by side and one upon another, formed not like those of other Swifts, but of straws and quill-feathers strongly agglutinated by the bird's saliva, and without any lining. It can, however, accommodate the nests of Swallows to its purpose, of which we met with one interesting example in the case of a nest of *Hirundo rufula*.

49. *UPUPA EPOPS*, L.

Abundant in the wooded districts. Returns about the end of March.

50. *OXYLOPHUS GLANDARIUS* (L.).

Not uncommon. Returns at the very beginning of March. The only eggs we obtained were in the nest of *Corvus cornix* in Gilead, near Rabbath-Ammon, thus confirming Messrs. Allen and Cochrane's observations on its habits in Egypt. We first discovered its eggs in Algeria, in the nest of *Pica mauritanica*; but no Crow bred there, and there is no Magpie in Palestine. I fully anticipate, however, that on Mount Carmel, where the Great Spotted Cuckoo is common, and the Crow is not, its eggs will be found in the nest of *Garrulus melanocephalus*.

## 51. CUCULUS CANORUS, L.

Common in spring, and a victim of much objugation from the noisy *Crateropus chalybeus*.

## 52. CUCULUS LIBANOTICUS, nov. sp.

Diagn. *C. canoro simillimus, sed pollice uno et dimidio minor; alis pollice brevioribus, colore hepatico, subtus albus, nigro transversim anguste lineatus, rectrice externa rufa, fasciis nigris subsericeis: tarsi semiplumatis: dorso rufo, lineis transversis nigris, uropygio unicolore.*

On the authority of Mr. G. R. Gray, I have ventured to describe this Cuckoo as new. Its affinities are with the *C. micropterus*, Gould, and *C. gularis*, Stephens. However, it is still more closely allied to *C. canorus*, if it be more than an hepatic variety. But the tarsi do not appear to be feathered so far down, while the outer tail-feathers, and indeed the rectrices generally, are barred with black instead of white. It is with great diffidence that I have described it as new. The specimen exhibited was shot by Mr. Cochrane in April, under the Lebanon, and therefore could not be a bird of the year.

## 53. YUNX TORQUILLA, L.

A summer resident. Not obtained before the middle of April.

54. PICUS SYRIACUS, H. & Ehr. (= *P. cruentatus*, Antinori?).

Found throughout the year in all suitable localities; and the only Woodpecker ever observed in the country.

## 55. ALCYON SMYRNENSIS, L.

Found in pairs, but never in large numbers, through the whole length of the Jordan, from Banias to Engedi. Several were shot on the Dead Sea; and we took two nests, one in the banks of a stream flowing into the Sea of Galilee, and another in the bank of the lake itself. In the crop of one bird I found a snake entire; in that of another several frogs. It never occurred out of the Jordan valley, where it is a resident.

## 56. ALCEDO ISPIDA, L.

Scantly distributed through the whole country, and on the shores of the Mediterranean.

## 57. CERYLE RUDIS (L.).

Very common, and frequent in small societies, both on the sea-coast in winter and in the Jordan valley throughout the year. Breeds in colonies on the banks of streams and by the Lake of Galilee, from the end of March to the end of May. An extremely active and vivacious bird, and very different in its habits from either of the preceding.

58. *MEROPS APIASTER*, L.

A regular migrant, returning in the beginning of April in great numbers, and living in large societies in every part of the country.

59. *MEROPS ÆGYPTIUS*, Forsk.

Scarce. Was not seen by us on this expedition, though noted by Mr. Cochrane once, and obtained in the Jordan valley on a former occasion by myself.

60. *MEROPS VIRIDIS*, L.

Obtained in the Jordan valley by Mr. Herschell.

61. *CORACIAS GARRULA*, L.

Abundant everywhere in spring. Appears in the beginning of April, with the Bee-eater.

62. *TROGLODYTES EUROPEUS*, Cuv.

Not common. Resident in the northern hills of Palestine.

63. *TICHODROMA MURARIA* (L.).

In the wadys near Gennesaret, in the deep Glen of the Litany, and in the dells of Lebanon. A permanent resident.

64. *SITTA SYRIACA*, Ehrenb.

Found among the rocks in the same localities as the former, and also in the valleys near Baniyas, south of Hermon.

65. *SITTA KRUEPERI*, Von Pelzeln, Oct. 1863.

Obtained by us in the glens south of Hermon, where Mr. Bartlett first shot it, and afterwards in the Gorge of the Litany. This Nut-hatch is more closely allied to our *S. caesia* than to the Eastern *S. europæa*, L. (= *S. uralensis*, Licht.); but differs in the rich red of the whole under surface, and in the absence of any white tips in the coloration of the abdominal and ventral feathers, which are of a deep chestnut.

66. *PARUS MAJOR*, L.

Common and resident in all wooded districts, but never found in the Ghor. The only Tit observed south of the Lebanon. Rather more distinct in its coloration than our British specimens.

67. *PARUS ATER*, L.

Only in the Lebanon. Numerous at the Cedar-grove. The colours more distinct and bright than in English specimens.

68. *PARUS LUGUBRIS*, Natt.

Obtained by J. H. Cochrane, Esq., in the Lebanon. As in the other Palestine species, this specimen is remarkably pure and distinct in its coloration.

## 69. MELANOCORYPHA CALANDRA (L.).

Extremely common in the highlands and corn-plains in spring and summer, and in the wilderness of Judæa in winter, at which season we did not meet with it in the maritime plain. It does not descend into the Ghor.

## 70. CALANDRELLA BRACHYDACTYLA, Kaup.

A summer migrant in Central Palestine.

## 71. CALANDRELLA REBOUDIA, Loche.

We found this distinct and Saharan species in the wilderness of Beersheba, in small flocks, in February.

## 72. CALANDRELLA HERMONENSIS, nov. sp., mihi.

*Supra rufo-cinnamomea, striis brunneis indistinctis, superciliis albescentibus, gula et corpore subtus pallide rufescentibus; collari pectorali lato nigricante, in medio interrupto: alis pallide fuscis, remigibus primis in parte externa albidis, rectricibus lateralibus in parte externa et in apice albis, et proximis rectricibus linea alba angustissima.*

Long. tota poll. 6, alæ 3·6, caudæ 2·6, tarsi 0·8.

This bird is at once distinguished from *C. brachydactyla* by its larger size, longer bill, bright rufous coloration, and by the distinctness of the blackish collar, approaching that of the Calandra Lark, and by the much smaller extent of the white on the outer tail-feathers. It is yet more distinct from the *Alauda pispoletta* of Pallas. We only found it on the slopes of Hermon and Lebanon. The egg is much larger than that of *A. brachydactyla*.

## 73. AMMOMANES DESERTI, var. (Licht.).

Frequent in small bands on the highlands near the Dead Sea. Not nearly so rufous as African specimens, and it may perhaps, from the markings of the tail-feathers, be considered a distinct species.

## 74. AMMOMANES FRATERCULUS, nov. sp., mihi.

*Ab A. isabellina differt statura minore, rostro brevissimo et tenui et gula isabellina nec albida.*

Long. tota 6·1, alæ 3·5, caudæ 2·7, tarsi 0·8, rostri a rictu 0·6.  
Long. tota *A. isabellina*, var., 6·8, alæ 4·0, caudæ 3·0, tarsi 0·9, rostri a rictu 0·85.

## 75. ALAUDA ARVENSIS, L.

Common in the maritime plains and northern uplands in winter. Not observed afterwards.

## 76. ALAUDA CANTARELLA, Bp.

In immense flocks in the wilderness of Judæa and Beersheba in winter. Not observed elsewhere or at other times. Exactly corresponds with Mr. Swinhoe's Chinese specimens.

## 77. ALAUDA ARBOREA, L.

Pretty generally but sparingly distributed. Winters in the country in small bands, which disperse in spring.

## 78. GALERIDA CRISTATA (L.).

In the north, a permanent resident.

## 79. GALERIDA ABYSSINICA, Bp.

The characteristic form in the southern wilderness. I can scarcely bring myself to believe in the specific distinction of these two.

## 80. GALERIDA ISABELLINA, Bp.

Only met with in the Ghor es Safieh, at the south-east end of the Dead Sea.

## 81. GALERIDA BRACHYURA, nov. sp., mihi.

*Cristata*; corpore supra arenicolori-fusco, plumarum parte media brunnea; primariis brunneis, cervino extus limbatis; cauda nigricante, rectricibus externis cinnamomeis, rectricibus proximis cinnamomeo limbatis et duabus mediis fuscis: subtus sordide alba, gula et pectore nigro striatis: alis ad minus 0·3 poll. a fine caudæ accedentibus.

Long. tota 5·7, alæ 3·9, caudæ 2·4, tarsi 1·0, rostri a rictu 0·85.

Seems to take the place, among the Crested Larks, of the Wood-Lark among the true *Alaudinae*, and is at once distinguished by the shortness of its tail and length of its wing. We found it only in the Ghor.

## 82. OTOCORYS PENICILLATA, Gould.

Found in some plenty close to the snow-line in Lebanon and on the top of Hermon, but nowhere else. Never descends far from the snow-line. Mr. Swinhoe's Tientsin specimen (referred to, P. Z. S. 1863, p. 272) is quite different, and, I conceive, is the true *O. alpestris*, var., not *O. penicillata*.

## 83. CERTHILAUDA DESERTORUM, Stanley.

Scarce in the southern desert.

## 84. ANTHUS CAMPESTRIS, Bechst.

Generally distributed and resident.

## 85. ANTHUS SPINOLETTA (L.).

Taken once only, in a marsh by Merom.

## 86. ANTHUS PRATENSIS (L.).

Common in winter; occasionally found throughout the year.

## 87. ANTHUS CERVINUS, K. &amp; Bl.

A specimen shot in winter on the coast.

88. *ANTHUS ARBOREUS*, Bechst.

Occurs sparsely throughout the country at all seasons.

89. *BUDYTES CINEREOCAPILLA* (Savi).

Of passage, only in spring, in flocks.

90. *BUDYTES NIGRICAPILLA*, Bp.

I never obtained this variety myself, but have seen it in the collections of others.

91. *MOTACILLA SULPHUREA*, Bechst.

Generally distributed in winter. Leaves in February.

92. *MOTACILLA ALBA*, L.

Extremely abundant in winter everywhere. Only a few pairs in the north of the country remain to breed. We took the nest in Galilee, among the hills.

93. *MOTACILLA LUGUBRIS*, Temm.

In my former list as obtained by Mr. Herschell. Not met with in this expedition.

94. *CINCLUS AQUATICUS*, Bechst., ? var.

Found only in the mountain-streams in the deep gorges of the Lebanon range. The white extends lower down the breast than in British specimens; the abdomen is not of so deep a chestnut, and the vent-coverts are tipped with whitish. The back of the head and the shoulders are of a more rufous tint than in any other examples I have seen.

95. *TURDUS PILARIS*, L.

Occurs but rarely in winter.

96. *TURDUS MUSICUS*, L.

Not very uncommon in winter; chiefly in the highlands. Noticed in Galilee in spring, but only occasionally.

97. *TURDUS MERULA*, L.

The Blackbird is nowhere common; but a few are to be found everywhere, and at all times of the year.

98. *IXOS XANTHOPYGIUS*, H. & Ehrenb.

One of the most characteristic birds of Palestine; known to the natives as the Bulbul. Resides the whole year, and is generally distributed, both on the sea-coast from Sidon to Jaffa, and throughout the Jordan valley, but especially plentiful in the oases near the Dead Sea. It is a magnificent songster, and builds a very neat nest rather high up in the trees, with three or four eggs covered thickly with rich red blotches and spots, and subject to great variation.



## 99. CRATEROPUS CHALYBEUS, Bp.

The most grotesque and amusing of all the birds of Palestine. It is amongst the most local species, being only found in the Dead Sea basin, and there in great abundance; but never ascends even as far as ten miles up the valley from the mouth of the Jordan, nor in any part of the Ghor. We found it at Jericho, Engedi, the Safieh, and under the north-east hills of Moab. It builds a large slovenly nest in the Zizyphus trees in March and April, and lays four or five glossy deep-blue eggs.

## 100. DRYMOICA GRACILIS, Rüpp.

Common throughout the country all the year, excepting in the hill-country. Builds a very neat domed nest near the ground, with four or five richly coloured pink eggs. It is a very noisy and conspicuous bird.

## 101. DRYMOICA —.

Found only in the most desolate wadys opening on the Salt Sea, where it flits from one scanty shrub to another. It differs from *Drymoica striaticeps*, described by me from the Sahara in 'Ibis,' 1859, p. 58, in the broader dark striæ on the head and neck, in the throat and breast striated with black, instead of the dull uniform white of the African bird, and in the deeper russet of the flanks.

## 102. CALAMOHERPE TURDOIDES, Boie.

A summer visitor.

## 103. CALAMOHERPE —.

Apparently differs from *C. turdoides*, not only in its coloration and rather smaller size, but in the second primary being less than the first, which is the longest of all.

## 104. CALAMOHERPE ARUNDINACEA, Gm.

Common. Returns from the south in the beginning of March.

## 105. CALAMOHERPE PALUSTRIS, Bechst.

Scarce.

## 106. AËDON GALACTODES (Temm.).

Identical with the European and N. African bird, and perfectly distinct from *A. familiaris*, Ménétr., which is common in Asia Minor, but which we never found in Palestine. It is the most abundant, at least the most conspicuous, warbler in spring and summer, but does not return before the middle of April. Found from the shores of the Dead Sea to the slopes of Lebanon.

## 107. CISTICOLA SCHÆNICOLA, Bp.

Local in marshy plains. A constant resident.

## 108. CALAMODYTA PHRAGMITIS, Bechst.

Not uncommon in spring in suitable localities.

## 109. CALAMODYTA MELANOPOGON (Temm.).

A single specimen shot by Mr. Bartlett in the Plain of Gennesaret in April.

## 110. CETTIA SERIGEA, Bp.

Frequently heard, but rarely seen, among the willows by small watercourses. A summer visitant.

## 111. LUSCINIOPSIS SAVII, Bp.

We obtained but a single specimen of this shy bird, on the Plain of Gennesaret in May.

## 112. LUSCINIOPSIS FLUVIATILIS, Meyer.

Obtained, in April and May, by the Lake of Galilee, and near the sources of the Jordan, at Lake Phiala.

## 113. HIPPOLAIS OLIVETORUM, Strickl.

Common in the olive-yards and oak-copses in the north of the country. Returns very late, and breeds in May and June.

## 114. HIPPOLAIS ELAICA, Linderm.

Extremely abundant in all parts of the country in summer. Returns to Jericho in March, and to the slopes of Hermon in April. Resorts to low shrubs and thickets, and especially to marshy spots, in preference to groves.

## 115. HIPPOLAIS UPCHERI, nov. sp., mihi.

*Major, cinerea, vix olivascens, subtus sordide alba; cauda rotundata, rectricibus extimis albo marginatis; remigum primo tectrices exteriores æquante, tertio longissimo, secundo sextum æquante.*

Long. tota poll. 5·7, alæ 2·75, caudæ 2·6, rostri a rictu 0·75.

This very distinct species, which I have much pleasure in naming after my indefatigable friend and companion in the expedition, H. M. Upcher, Esq., seems to be exclusively a northern bird, never frequenting olive-groves, but the dry oak-copses and vineyards of the slopes of Lebanon and Hermon. Its nest and note are very distinct from those of its congeners.

## 116. PHYLLOPNEUSTE TROCHILUS (L.).

Very common in winter; never found after March. I cannot regard H. & Ehrenb.'s species *Curruca viridula* as distinct.

## 117. PHYLLOPNEUSTE SIBILATRIX, Bechst.

Rather plentiful on passage in spring. Never met with in winter, nor after the spring migration.

118. PHYLLOPNEUSTE RUF A (Lath.).

In vast numbers all through the winter in every part of the country. Never seen after February.

119. PHYLLOPNEUSTE BONELLII (Vieill.).

A summer visitant. Returns in the beginning of April.

120. PHYLLOPNEUSTE BREVIROSTRIS (Strickl.).

Several specimens shot in winter at Jericho and at Engedi seem referable to Mr. Strickland's Smyrna species, so far as can be determined from his diagnosis, without the opportunity of examining his type.

121. REGULOIDES SUPERCILIOSUS, Gm. (*Regulus modestus*, Gould.)

Obtained in winter in the Ghor.

122. SYLVIA MELANOCEPHALA (Gm.).

Generally distributed, and resident.

123. SYLVIA CURRUCA, Lath.

Common, but not observed until March.

124. SYLVIA CINEREA, Bp.

Extremely abundant everywhere, but not so numerous in winter as in spring. One of the earliest breeders, having eggs in the middle of March.

125. SYLVIA CONSPICILLATA, Marm.

Scarce, but resident in various localities.

126. SYLVIA ATRICAPILLA (L.).

Very common in every part of the country, and a permanent resident in all the districts. The male in winter seems to have the same plumage as the female.

127. SYLVIA RÜPPELLII, Temm.

Not very common. Resident.

128. SYLVIA HORTENSIS (Gm.).

Occasionally obtained in spring.

129. SYLVIA ORPHEA, Temm.

Frequent in spring in the wooded districts. Two specimens out of five agree with H. & Ehrenb.'s variety *Helenaë*: the other three do not; but in one instance the male is var. *Helenaë*. The female shot with him off the nest is of the ordinary European type.

130. *SYLVIA NISORIA*, Bechst.

Scarce, and chiefly observed in the dry wadys on its vernal migration. Very few appeared to remain.

131. *PHILOMELA LUSCINIA* (L.).

Generally distributed. First seen about the end of March. Remains to breed chiefly in the Jordan valley and the sheltered wadys. Never observed or heard in the olive-groves.

132. *RUBECULA FAMILIARIS*, Blyth.

The Robin is very common in all parts of the country; but not one was seen after the end of February.

133. *CYANECULA CÆRULECULA* (Pall.).

Another winter visitant, though much less common. Chiefly in the marshy lowlands.

134. *CYANECULA SUECICA* (L.).

Obtained by Messrs. Shepherd and Upcher, near Jaffa, in winter.

135. *RUTICILLA PHŒNICURA* (L.).

An abundant summer visitant, reappearing the last week in March, and remaining to breed.

136. *RUTICILLA TITHYS*, Scop.

A very common and characteristic bird on all the highlands and bare hills during the winter, and particularly on the sea-coast. I believe that it does not remain there to breed, but retires in spring to the mountain-sides further north. We found the variety *R. cairii* common, and intermingled with the ordinary type.

137. *RUTICILLA SEMIRUFA*, H. & Ehrenb.

Only found on the higher slopes of Hermon and Lebanon, where it is very shy and wary. The note is varied and powerful. We obtained the nest, with eggs not very hard set, so late as June 26th, under the cedars of Lebanon. The eggs are exactly like those of *R. phœnicura*. A very conspicuous and common bird in the narrow limits within which it occurs.

138. *PETROCINCLA SAXATILIS* (L.).

Never seen in winter. Large flocks observed on Mount Gêrizim at the time of the vernal migration. A few breed in Galilee and Lebanon.

139. *PETROCINCLA CYANEA* (L.).

Most unlike the last species in all but its localities. A very solitary bird, but resident in scattered pairs throughout the whole country, wherever there are rocks, through the year. It feeds at the water-edge on the sea-shore, on small Crustacea, and is generally to be found among old ruins. Its nest was found by Mr. Cochrane

and myself, with four eggs set on, near the Lake of Galilee, on April 2nd.

140. *BESSONORNIS ALBIGULARIS* (Von Pelzeln).

This bird has very recently been described at Vienna by Herr von Pelzeln under the name of *Saxicola albigularis*. Supported by the high authority of Mr. G. R. Gray, I have no hesitation in removing this singular and almost unique species into the genus *Bessonornis* of Smith. My knowledge of the bird's habits and appearance in life—its perching among the thickest foliage, where it pours forth a song which rivals the Nightingale's—its nest and eggs, which have no correspondence with those of the *Saxicolinæ*, but approach those of *S. orphea* and *S. nisoria* more closely than any other—all convince me that it has no affinities with the true *Saxicolinæ*. We only found it on the higher slopes of Hermon and of Lebanon. The female which I exhibit has not yet been described.

141. *DROMOLÆA MONACHA*, Rüpp.

Only found at the south end of the Dead Sea.

142. *DROMOLÆA LEUCOCEPHALA*, Br.

Obtained on the barren ravines by the Dead Sea.

143. *DROMOLÆA LEUCOPYGIA*, Br.

In similar localities as the last. Though not found together by me, I am by no means prepared to maintain their specific distinctness, as I find white feathers peeping out on the head of *D. leucopygia* at times.

144. *SAXICOLA PHILOTHAMNA*, Tristram.

We met with my old Saharan acquaintance in a district very like that in which I first discovered it, to the south-east of Beersheba, in the desert. It was not uncommon, but in a very restricted locality. A resident.

145. *SAXICOLA CENANTHE*, L.

Very common in the northern hills and on Carmel. Appears in the south only on its migration.

146. *SAXICOLA ROSTRATA*, H. & Ehrenb.

If this be a good species, which I doubt, it is more plentiful than *S. cenanthe* near the snow-line of Hermon and Lebanon, where we found it breeding abundantly.

147. *SAXICOLA ISABELLINA*, Rüpp.

A resident in the southern part of the wilderness of Judæa.

148. *SAXICOLA SALTATRIX*, Ménétr.

Found in some numbers on the higher plains of the north. Appears to be only a large variety of the preceding, if it be not identical.

149. *SAXICOLA LIBANOTICA*, H. & Ehrenb.

Generally distributed, but in very small numbers, over the hill-country and wilderness of Judæa. A permanent resident.

150. *SAXICOLA LUGENS*, Temm. (*S. leucomela*, Gould.)

Very generally occurs throughout the year in all the barer portions of the country, but neither in the plains nor in the loftier mountains.

151. *SAXICOLA LEUCOMELA*, Temm. (*S. lugens*, Licht.)

Occurs by the Dead Sea.

152. *SAXICOLA EURYMELÆNA*, H. & Ehrenb.

Very numerous on Carmel, Tabor, and in the cultivated plains, in spring. Returns to breed about the 20th of March.

153. *SAXICOLA AMPHILEUCA*, H. & Ehrenb.

Returns apparently a few days later than the preceding species. Not so numerous. The two seem never to intermingle, though in similar localities.

154. *SAXICOLA XANTHOMELÆNA*, H. & Ehrenb.

A single specimen shot at Shiloh in December.

155. *SAXICOLA DESERTI*, Rüpp.

Two specimens obtained at the north end of the Dead Sea in January.

156. *SAXICOLA HALOPHILA*, Tristram.

One specimen obtained under Jebel Usdem (the Salt Mountain). It is interesting to note that the type specimens were shot at a salt-mountain in the Sahara.

157. *PRATINCOLA MELANURA*, Rüpp. (= *Cercomela asthenia*, Bp.).

Very common throughout the year in the Dead Sea basin, particularly at Engedi. A few individuals found up the gorge of the Kedron and on the wilds between Jerusalem and Jericho. Breeds early. The eggs very like that of *Saxicola eurymelæna* or *S. stapa-zina*.

158. *PRATINCOLA RUBICOLA* (L.).

Abundant in all the lowlands and central districts through the winter; but leaves early in spring.

159. *PRATINCOLA RUBETRA* (L.).

Only observed and obtained at the time of the spring migration.

160. *ACCENTOR MODULARIS* (L.).

Scarce. A permanent resident in the north.

161. *MUSCICAPA COLLARIS*, Bechst.

Occasionally occurs in the wooded districts in spring and summer.

162. *BUTALIS GRISOLA* (L.).

Very common. Rather a late migrant, and not observed till May.

163. *HIRUNDO RUSTICA*, L.

Plentiful everywhere. Does not remain through the winter.

164. *HIRUNDO CAHIRICA*, Licht.

With the former. A few remain on the sea-coast and in the Ghor all winter; but their numbers are vastly increased in spring.

165. *HIRUNDO RUFULA*, Temm.

This beautiful Swallow is most abundant all through the country, both in the plains, the Ghor, and the hills, after the middle of March. It does not build in communities, though, like other Swallows, feeding in large flocks on the wing. The nest is like that of the House-martin, but with a long, beautifully formed entrance-passage, and is attached to the roof of a cave, or to the under side of an overhanging rock. The eggs are pure white.

166. *COTYLE RUPESTRIS* (Scop.).

A permanent resident in the wadys adjoining the Ghor, and in the deep ravines of the Litany River. Very numerous wherever found.

167. *COTYLE PALUSTRIS* (Steph.).

Only found round the Dead Sea basin, where it is a permanent resident.

168. *COTYLE RIPARIA* (L.).

A summer visitant only. Not common.

169. *CHELIDON URBICA* (L.).

Very common in the neighbourhood of towns and villages. Returns later in the spring than any of its congeners.

170. *ORIOLOUS GALBULA*, L.

Frequent in April and May. Few, if any, appear to remain to nest in the country.

171. *LANIUS COLLURIO*, L.

Abundant on the higher portions of Hermon and Lebanon, about the limit of the brushwood. Not seen in the south. A very late breeder, eggs having been taken by us as late as June 20th.

172. *LANIUS RUFUS*, Br.

Returns in the end of March, and after that time is to be seen on almost every bush. Does not, however, ascend the mountain-sides

so high as *L. collurio*. As plentiful by the Dead Sea as in Judæa, Galilee, and Gilead.

173. *LANIUS EXCUBITOR*, L.

Very common and a permanent resident, both in the Ghor and on the maritime plains.

174. *LANIUS MERIDIONALIS*, Temm.

Confined to more southern localities, and a migrant.

175. *LANIUS MINOR*, Gm.

I shot this bird in 1858 near Jaffa, but did not meet with it on this expedition. It is mentioned by Hemprich and Ehrenberg.

176. *LANIUS PERSONATUS*, Temm.

A migrant, returning in the beginning of April. Its nest is small, neat, and compact, resembling that of a Chaffinch, rather than those of other Shrikes. Very common in the wooded districts.

177. *GARRULUS MELANOCEPHALUS*, Bonelli.

Not uncommon in forests and olive-yards throughout the year. Never descends into the warmer regions of the Jordan valley. Particularly abundant in the forests of Gilead and Bashan. (The Magpie is unknown in Palestine.)

178. *CORVUS MONEDULA*, L.

Abounds at Nablous, and occurs in the hilly districts of Central Palestine.

179. *CORVUS COLLARIS*, Drummond.

Takes the place of *C. monedula* in the Ghor and on the east of Jordan. Neither species observed in the south.

180. *CORVUS AGRICOLA*, nov. sp., mihi.

*Similis C. frugilego, sed capite et corpore subtus virescenti-nigris, nec purpureo-nigris, juguli plumis lanceolatis, sicut in Corvo capensi; alias ut in C. frugilego; cauda rotundata et virescenti-nigra; facie rarissime denudata.*

A comparison of my series (and we preserved eight specimens) with *C. frugilegus*, *C. pastinator*, and *C. capensis* satisfies me that this bird is far more distinct from the common Rook than *C. pastinator* of China. It has the peculiar green-black reflections of *C. capensis* over its whole body, and especially on the head, which is blue-black in our British bird and purple in the Chinese. Our specimens were all obtained in winter and spring; yet in one only was the basal portion of the mandibles denuded entirely, and in another partially. It no way differs from our Rook in size; and is found chiefly about Jerusalem, Nablous, and the cultivated portions of Central Palestine.



181. *CORVUS CORNIX*, L.

Common, and resident on the coast and highlands. Not found in the Ghor. The *Oxylophus glandarius* deposits its eggs in its nest.

182. *CORVUS AFFINIS*, Rüpp.

Only observed in the Dead Sea basin, at the southern extremity. It is a striking and peculiar species, both on the wing and in its ringing, almost startling note, most unlike that of any other of the *Corvidæ*.

183. *CORVUS UMBRINUS*, Hedenborg; Sund. K. Vet. Ak. Handl. 1838, p. 198.

The common Raven of Jerusalem and the Jordan valley, but not on the coast. Breeds solitarily in the cliffs.

184. *CORVUS CORAX*, L.

Found in all parts of the country. Abundant about the Mosque of Omar at Jerusalem in winter, in company with the last species.

185. *PYRRHOCORAX ALPINUS*, Vieill.

Only found in small bands on the summit of Hermon and the highest parts of the Lebanon, always close to the snow-line.

186. *NECTARINIA OSEA* (Bp.).

Very numerous in the seething moist oases round the Dead Sea, where it resides throughout the year, and breeds towards the end of March. A few pairs extend as far as the Plain of Gennesaret, and I have even found it in warm glens on the south side of Mount Carmel. Its affinities are with *N. asiatica* (L.) of India and *N. affinis*, Rüpp., of Abyssinia; but in coloration it is distinct from either. The nest is a beautiful piece of workmanship, round, and suspended, like that of the *Ploceus* from the end of a twig, with an entrance halfway down the side. The eggs are whitish, with a zone of dull greenish spots. The note is not unlike the call of the Blue Tit.

187. *AMYDRUS TRISTRAMII*, Selater.

In small colonies, not only at Marsaba, but in various glens in the most desolate and precipitous ranges close to the Dead Sea. The banks of the Arnon (Wady Mojib), with its tremendous precipices, are a favourite haunt of this desert-loving bird.

188. *PASTOR ROSEUS* (L.).

Uncertain in the time of its visits. Seen by me in 1858, but not during this expedition.

189. *STURNUS VULGARIS*, L.

In large flocks in the maritime plains in winter only.

190. *STURNUS UNICOLOR*, Marm.

In winter on the Plain of Sharon.

191. *EMBERIZA MILIARIA*, L.

Very common on all the corn-plains throughout the year.

192. *EMBERIZA HORTULANA*, L.

Abundant in the hills and plains in spring. Does not appear to descend into the Ghor.

193. *EMBERIZA CIA*, L.

Found in winter on the top of Carmel, and in June breeding in the highest part of Lebanon.

194. *EMBERIZA CÆSIA*, Cretzs.

The most abundant of all the Buntings among the brushwood and scanty shrubs of Central Palestine, from Hermon to the Litany. Returns about the end of March. Prefers the hill-sides, where it builds its nest under the dwarf shrubs.

195. *EMBERIZA STRIOLATA*, Temm.

Found at Engedi in winter, in a small flock.

196. *EUSPIZA MELANOCEPHALA* (Scop.).

Returns from the south in the beginning of April, and is then very numerous both on the wooded hills and among olive-groves, where it pours forth its varied note from the tops of the highest branches. The nest is placed in a bush, not far from the ground; and the eggs mark at once the separation of this genus from *Emberiza*.

197. *COCCOTHAUSTES VULGARIS*, Br.

Observed by Mr. Cochrane in Gilead.

198. *FRINGILLA CŒLEBS*, L.

Frequent in winter. Returns to the highest parts of Lebanon in spring. Breeds plentifully, in May and June, at the Cedars.

199. *PASSER DOMESTICUS* (L.).

Abundant about the cities.

200. *PASSER CISALPINUS*, Temm.

The chestnut-headed variety, and every intermediate gradation, occur in my series. The chestnut-headed birds are mostly from Jerusalem and the east; the ash-coloured head marks the northern and maritime specimens.

201. *PASSER SALICARIUS*, Schleg.

In myriads in the Ghor. I have seen more than fifty nests on one tree, and the noise of the colonies is absolutely deafening. Quite distinct in its habits from the former species.

202. *PASSER MOABITICUS*, Tristr. P. Z. S. 1864, p. 169.

This new and lovely little species I have already described through

Dr. Sclater. Its range is most limited—only round the little fresh-water fountains and rills which run into the Dead Sea at the west and south-east.

203. *PETRONIA STULTA*, Gm.

Very common on the higher lands everywhere in spring. Returns late, and often selects for nidification the mouths and sides of old wells.

204. *PETRONIA BRACHYDACTYLA*, Bp.

This interesting desert-bird, first noticed by Hemprich, we discovered only in the bare plateaux north of Hermon, by the Litany, and in Cœlesyria. Its nest is neat and compact, in a bush; and the eggs white, with black spots, like a diminutive Golden Oriole's.

205. *CHLOROSPIZA CHLORIS*, L.

A winter visitant on the coast.

206. *CHLOROSPIZA CHLOROTICA*, Licht.

A summer visitant in all the wooded districts, and especially among the olive-groves and gardens, where its habits and nidification are exactly those of our own bird.

207. *CARDUELIS ELEGANS*, Steph.

A permanent resident, chiefly in the olive-yards.

208. *SERINUS MERIDIONALIS*, Bp.

Not uncommon in wooded districts near the coast in winter. Not met with in the interior, nor later in the season.

209. *SERINUS PUSILLUS* (Pall.).

A single specimen was obtained in the Lebanon this year by Sign. F. Fidas, of Beyrout. We never met with the bird.

210. *SERINUS AURIFRONS*, nov. sp., mihi.

*S. corpore supra flavido, fusco striato; fronte, pileo, uropygio, scapularibus aureo-flavis, fronte precipue aurea; corpore toto subtus flavescente, nec striato; collari flavissimo; remigibus nigris, flavo externe limbatis; scapularibus flavidis; rectricibus omnibus nigris, albido externe limbatis et dimidiatim interne albidis. Major quam S. meridionalis.*

Long. tota poll. 5·15, alæ 3, caudæ 2·6.

I should have supposed this bird to be the *Fringilla syriaca* of H. & Ehrenb., but that their diagnosis is quite irreconcilable with my specimens. The species is not uncommon in the shrubby districts of Hermon and at the cedars of Lebanon. The birds of the year have a rich russet hue, in place of the yellow. The nest is linnet-like, and the eggs approach those of the Goldfinch. The male has a powerful and varied note: it is much larger than the Serine Finch.

211. *CARPODACUS PHENICOPTERUS*, Bp. (*C. sanguineus*, Gould.)

Shot by J. H. Cochrane, Esq., in the north of Palestine, under Lebanon.

212. *ERYTHROSPIZA GITHAGINEA*, Licht.

In the southern deserts a resident.

213. *MONTIFRINGILLA NIVALIS* (L.).

On the summits of Hermon and Lebanon.

214. *LINOTA CANNABINA* (L.).

Common in winter through Central Palestine, and in spring in the mountains and northern wooded districts. Breeds close to the top of Hermon.

215. *COLUMBA PALUMBUS*, L.

In winter on Mount Carmel and, in countless myriads, in the forests of Gilead and Bashan. After March I never met with it.

216. *COLUMBA ŒNAS*, L.

Obtained in 1858. Not among my collections of this year.

217. *COLUMBA SCHIMPERI*, Bp.

The common Rock-dove of the Ghor and adjacent ravines. As plentiful as in Egypt.

218. *COLUMBA LIVIA*, L.

In the highlands and on Mount Carmel. The two species can easily be distinguished on the wing by the different coloration of the rump and by the larger size of *C. livia*.

219. *TURTUR RISORIUS*, Swains.

Rather scarce in winter in the Ghor, but abundant at the south-east end of the Dead Sea. Returns in March, and is then distributed more or less plentifully over the whole country, but especially in the Ghor.

220. *TURTUR AURITUS*, Ray.

Overspreads the whole of the Ghor and the rest of the country in incredible numbers in spring and summer, feeding chiefly on the various clovers; but never seen in winter. Returns about March 20.

221. *TURTUR SENEGALENSIS* (L.).

A permanent resident in the Ghor, and even in the gardens and courtyards of Jerusalem. Unlike *T. risorius*, its numbers do not appear to be increased by the vernal migration. Not observed in the north.

222. *PTEROCLES EXUSTUS*, Temm.

In flocks in the southern desert near Beersheba.

223. *PTEROCLES SENEGALENSIS*, Lath.

More plentiful than the last, and often in smaller bands. Obtained both to the S.E. of Beersheba and near the mouth of the Jordan.

224. *PTEROCLES ARENARIUS*, Temm.

Obtained by J. H. Cochrane, Esq., north-east of Hermon, and observed also by myself in the same district.

225. *PTEROCLES ALCHATA* (L.).

Seen several times in flocks, though not obtained. I have not the slightest hesitation in enumerating it as a Palestine species.

226. *FRANCOLINUS VULGARIS*, Bp.

Common in the plains of Gennesaret, Huleh, and Acre.

227. *CACCABIS SAXATILIS*, Bp.

Very common in every part of the country, excepting the Ghor.

228. *CACCABIS HEYII*, Temm.

Abundant in the Dead Sea basin and the adjoining ravines. Never met with elsewhere. Breeds generally in holes in and under rocks. A resident species.

229. *COTURNIX VULGARIS*, Schl.

Occasionally put up throughout the winter. In spring most abundant in all the corn-fields and grassy plains, and especially in the Ghor.

230. *STRUTHIO CAMELUS*, L.

I possess a skin procured by Aghyle Agha, the well-known Sheik of Tabor, and given to me by T. B. Sandwith, Esq., H.B.M. Consul at Caiffa. Aghyle assures me the bird was killed in the Belka, and therefore can fairly be included in the Fauna of Palestine.

231. *OTIS TARDA*, L.

I have frequently heard of this bird as found in the plain of Sharon, but never saw it. It is common in Northern Syria, and therefore probably still exists in the maritime plains.

232. *OTIS TETRAX*, L.

I am assured that the little Bustard resorts to the barley-plains in spring, but it has not come under my personal observation.

233. *HOUBARA UNDULATA*, Jacq.

In the desert portions of the Ghor, where it is a resident and breeds.

234. *ÆDICNEMUS CREPITANS* (L.).

Very common in the Ghor and in the wilderness of Judæa throughout the year.

235. *CURSORIUS ISABELLINUS*, auct.

Shot by J. H. Cochrane, Esq., near Acre.

236. *PLUVIANUS ÆGYPTIACUS* (L.).

Obtained by Mr. Herschell in the Jordan valley.

237. *GLAREOLA PRATINCOLA* (L.).

Very plentiful in spring on the plains of Huleh, where it breeds, and also on the plains of Gennesaret and of Acre.

238. *VANELLUS CRISTATUS*, Mey.

Common in winter throughout the country. Returns to the north early in March.

239. *HOPLOPTERUS SPINOSUS* (Hasselq.).

Met with in small numbers in spring wherever there is water. Not observed in winter.

240. *CHARADRIUS PLUVIALIS*, L.

Very common in winter both in the plains and on the highlands.

241. *CHARADRIUS MORINELLUS*, L.

In vast flocks in the wilderness of Judæa, near Beersheba, in winter.

242. *CHARADRIUS ASIATICUS*, Pall.

In small numbers, mingling with the last species.

243. *CHARADRIUS MONGOLICUS*, Pall.

Shot in winter on the banks of the Kishon. In its winter dress it closely resembles *C. asiaticus*, and at first sight can only be distinguished by its much smaller size. But while in *C. asiaticus* the outer rectrices are pure white, in *C. mongolicus* all the tail-feathers have alike a broad bar of brown across them.

244. *ÆGIALITES HIATICULA* (L.).

Shot on the shores of the Lake of Galilee in April.

245. *ÆGIALITES CANTIANUS* (Lath.).

Very common on the coast, both in winter and spring.

246. *ÆGIALITES MINOR* (Meyer).

Not rare on the banks of the Kishon.

247. *GRUS CINEREA*, L.

In immense flocks in winter in the southern wilderness.

248. *ARDEA CINEREA*, L.

On the coast, the Kishon, Jordan, Lake of Galilee, and marshes of Huleh.

249. *ARDEA PURPUREA*, L.

In the same localities.

250. *EGRETTA ALBA* (L.).

By the Lake of Galilee and the marshes of Huleh.

251. *EGRETTA GARZETTA* (L.).

In the same localities.

252. *BUPHUS RUSSATUS*, Wagl.

In large flocks in the Huleh marshes, and sparingly elsewhere.

253. *BUPHUS RALLOIDES*, Scop.

In the Huleh in flocks. Found in smaller numbers in all the marshes. These four last-named species were not observed till spring.

254. *ARDEOLA MINUTA* (L.).

Very common among the reeds in the northern marshes.

255. *BOTAURUS STELLARIS* (L.).

Observed in the Huleh marshes.

256. *PLATALEA LEUCORODIA*, L.

An occasional visitant. Not obtained by us; but in a local collection at Jerusalem.

257. *CICONIA ALBA*, L.

Flocks of Storks cover the whole land, hill and plain, by thousands for about a month from the first week in April. We were not able to discover it breeding.

258. *CICONIA NIGRA*, L.

In small bands throughout the winter in the barren plains by the Dead Sea.

259. *FALCINELLUS IGNEUS* (Gm.).

I am sure I once saw this bird near the Jordan, though we never obtained a specimen.

260. *RECURVIROSTRA AVOCETTA*, L.

Scarce; by the Lake of Galilee and elsewhere.

261. *HIMANTOPUS MELANOPTERUS*, Temm.

Not unfrequent in shallow marshy lakes. Breeds between Jenin and Nazareth.

262. *NUMENIUS* —?

We saw Curlews several times in winter, but never obtained a specimen.

263. *TOTANUS STAGNATILIS*, Bechst.

Scarce.

264. *TOTANUS CALIDRIS*, Bechst.

Common in winter.

265. *TOTANUS OCHROPUS*, L.

Dispersed in all parts of the country. Remains till June.

266. *TOTANUS GLAREOLA*, L.

Obtained in winter.

267. *TRINGOIDES HYPOLEUCOS* (L.).

Very common in winter and spring.

268. *CALIDRIS ARENARIA* (L.).

Rare in winter.

269. *TRINGA CINCLUS*, L.

Very common on the coast in winter.

270. *TRINGA SUBARQUATA*, Guld.

Rare.

271. *TRINGA MINUTA*, Leisl.

Once seen on the coast in December; and a pair shot at the south end of the Dead Sea in February, out of a small flock.

272. *SCOLOPAX RUSTICULA*, L.

Not rare in winter. Mr. H. M. Upcher shot one out of a cave, very high up in a bare and woodless ravine.

273. *SCOLOPAX GALLINAGO*, L.

Common.

274. *SCOLOPAX GALLINULA*, L.

One shot in the Plain of Esdraelon.

275. *CREX PRATENSIS*, Bechst.

Not rare. Met with at all seasons. One shot in December, in a garden at Sidon.

276. *RALLUS AQUATICUS*, L.

Scattered in all parts of the country, from the Dead Sea northwards; a permanent resident.

277. *GALLINULA CHLOROPUS* (L.).

Common.



278. *PORPHYRIO HYACINTHINUS*, Temm.

In the marshes of Huleh.

279. *FULICA ATRA*, L.

Frequent. One shot by H. M. Upcher, Esq., under Jebel Usdem, in the Dead Sea.

280. *PHÆNICOPTERUS ANTIQUORUM*, Temm.

Shot on the Kishon, and frequently seen in other districts.

281. *CYGNUS MUSICUS*, L.

I possess a specimen which was brought into Jerusalem from the Pools of Solomon, and purchased by Dr. Chaplin, of the Jewish mission, a scientific and energetic naturalist, who presented it to me in a fresh state on December 26th.

282. *CHENALOPEX ÆGYPTIACA* (L.).

Frequently observed on the coast and by the Dead Sea.

283. *ANSER SEGETUM*, Bechst.

In the market at Beyrout.

284. *ANSER BRENTA*, Pall.

On passage.

285. *CASARCA RUTILA*, Pall.

In the Sebkhah Safieh, at the south end of the Dead Sea, and breeding in the hills of Northern Galilee.

286. *ANAS BOSCHAS*, L.

In winter.

287. *ANAS STREPERA*, L.

In winter.

288. *ANAS CRECCA*, L.

Not uncommon.

289. *ANAS MARMORATA*, Temm.

Very numerous in the marshes of Huleh, where it evidently breeds, but in places wholly inaccessible.

290. *ANAS ACUTA*, L.

In winter.

291. *RHYNCHASPIS CLYPEATA* (L.).

Observed in various districts.

292. *MARECA PENELOPE*, L.

In winter on the Jordan.

293. *FULIGULA MARILA*.

In winter on the coast.

294. *FULIGULA CRISTATA*, Ray.

In winter.

295. *FULIGULA NYROCA*, Gld.

Not uncommon. I believe it remains to breed.

296. *FULIGULA FERINA* (L.).

By far the most common of all the Ducks in winter. It swarms on the Jordan.

297. *OIDEMIA NIGRA*, L.

Noticed in winter on the coast.

298. *ERISMATURA MERSA*, Bp.

On the Lake of Galilee.

299. *MERGUS SERRATOR*, L.

Very common in winter.

300. *MERGUS ALBELLUS*, L.

Once found on the coast.

301. *PODICEPS CRISTATUS*, L.

Very common throughout the year, from the south of the Dead Sea up to the waters of Merom. Breeds in the Huleh.

302. *PODICEPS AURITUS*, L.

Most abundant on the Lake of Galilee.

303. *PODICEPS MINOR*, Lath.

Common in all parts of the country.

304. *PUFFINUS ANGLORUM*, Ray.

I found one on the shore under Mount Carmel in December.

305. *LARUS ICHTHYAËTOS*, Pall.

This most noble of all the Gull tribe is frequent in spring on the Lake of Galilee, and we also obtained a specimen in winter dress at the mouth of the Kishon.

306. *LARUS ARGENTATUS*, Brnn.

Common on the coast.

307. *LARUS FUSCUS*, L.

On the Lake of Galilee, as well as on the coast.

308. *LARUS CANUS*, L.

Common.

309. *LARUS AUDOUINI*, Payr.

On the Dead Sea, Jordan, and Lake of Galilee. Very common.

310. *LARUS GELASTES*, Licht.

On the coast.

311. *LARUS MELANOCEPHALUS*, Temm.

Obtained in my first visit, off Jaffa.

312. *LARUS RIDIBUNDUS*, L.

Extremely common.

313. *STERNA VELOX*, Rüpp.

On the Lake of Galilee.

314. *STERNA ANGLICA*, Mont.

On the coast.

315. *STERNA HYBRIDA*, Pall.

On the marshes of Huleh.

316. *STERNA CASPIA*, Pall.

Obtained in 1858 off Jaffa.

317. *HYDROCHELIDON NIGRA* (L.).

Not common.

318. *STERNULA MINUTA* (L.).

On the coast.

319. *PELECANUS ONOCROTALUS*, L.

Occasional.

320. *PELECANUS CRISPUS*, Bruch.

Occasional.

321. *PHALACROCORAX CARBO*, L.

Common on the coast.

322. *PHALACROCORAX PYGMÆUS*, Pall.

Scarce ; on streams flowing into the Mediterranean.

This list is confined strictly to species which have come under our personal observation, and, unless the contrary is stated, to those in the collections either of myself or my friends. It is still most imperfect, especially in the great classes of Grallatores and Natatores. Comparing the catalogue with those of the extremities of the Palæ-

arctic region east and west, we find, out of Mr. Swinhoe's list of 253 Chinese land-birds, 36 species common to Palestine. Out of 210 Chinese Waders and Waterfowl, 57 are common to Palestine.

Out of 230 Palestine land-birds, 79 are common to the British Isles, excluding from the British list all mere accidental stragglers; and out of 92 Palestine Gallatores and Natatores, 55 can justly be reckoned as ordinary British birds.

Of the whole 322 species noted in Palestine, 260 are included in the European lists; 31 are common to Eastern Africa, but are non-European species, or merely the most accidental stragglers, and are chiefly desert species of Nubia and the Sahara; 7 are of Eastern Asia; 4 of Northern Asia, *Serinus pusillus*, *Carpodacus erythrinus*, *Charadrius asiaticus*, and *Charadrius mongolicus*; 4 of the Gulls and Terns are characteristic of the Red Sea; and 27 species are, so far as our present knowledge extends, peculiar to Palestine and districts immediately adjacent, of which 9 species are now described for the first time, while several others, as *Cypselus galilæensis*, *Sitta krueperi*, *Bessonornis albigularis*, *Petronia brachydactyla*, *Nectarinia osea*, as well as most of Hemprich and Ehrenberg's new species, have not before been brought to England. Every species described by Hemprich and Ehrenberg has been obtained and identified during this expedition, excepting one doubtful species.

#### 4. NOTICE OF A NEW VARIETY OF GALAGO FROM QUILLIMANE (OTOGALE CRASSICAUDATA, VAR. KIRKII). BY DR. J. E. GRAY, F.R.S., ETC.

Dr. Kirk has kindly sent to the British Museum the skin and skull of a *Galago*, which he collected at Quillimane; but he says that he also observed it in other parts of Africa, as at Mozambique and on the Delta, among the palm-trees.

It is very different in colour from the specimen of *Otogale crassicaudata* in the British Museum; but we (for in the comparison I was assisted by Professor Allman and Dr. Kirk) cannot discover any perceptible difference between the skulls of the two specimens, more than what must arise from one being rather younger than the other. I have therefore determined to describe it as a variety, and apply to it the name of Dr. Kirk as a distinguishing mark. I think it very probable that these animals change considerably the colour of the fur, according to the season.

##### OTOGALE CRASSICAUDATA, VAR. KIRKII.

The fur pale ashy grey; the hairs of the general fur are black, with grey tips, and the body is scattered with long, projecting, rigid, black hairs. The cheeks and underside of the body and inside of the limbs whiter; the face, crown of the head, nape, middle of the back, shoulders, and outside of the fore limbs washed with yellowish brown, darkest on the crown, nape, and between the shoul-

ders; the fore feet and the hind feet to the heel dark brown; tail reddish brown, with numerous intermixed longer, black, thicker rigid, and slender softer hairs.

Dr. Kirk has kindly furnished me with the following particulars of the habits of this animal. It proves that man is not the only animal that likes fermented liquors, and takes them to excess after he has once tasted them. (On mentioning this fact to a friend, he told me he had, a short time ago, given a half-grown Scotch Terrier to a distiller, and that the dog had been returned to him because he could not by any correction be prevented from drinking the spirit as it came from the still, or any other spirits it could get, and would stagger and reel about, verifying the term, "a drunken dog," so often applied to inebriated men.)

"51 Thurloe Square, W., 22nd Oct., 1864.

"MY DEAR GRAY,—I am acquainted with two species of *Galago* in East Tropical Africa. The one is probably the *G. maholi* of Smith; but, never having captured specimens for comparison, there remains a doubt. Habits and appearance are identical. I have seen it frequently in the wooded mountainous regions about Tete, on the Zambesi, also on the shores of the Nyassa Lake. During the day it sits in trees or bush, is unwilling to move, and stares at the passers by; when it does make off, it goes with great speed by a series of leaps. It is active after sunset, when it will dart about, attracted by the camp-fires, making leaps of six feet almost horizontally, as noiseless as an owl.

"The second species is the *Otolicnus crassicaudatus*, differing from the specimen under that name in the British Museum in the colour of the fur, although no variety was seen among the specimens which came under my notice on the coast.

"While the *G. maholi* is peculiar to the interior, where its geographical range seems to be great, the other, or 'Great-tailed *Galago*,' is confined to the maritime region—so far as I know, never penetrating beyond the band of wood known generally as the mangrove-forests. By the Portuguese it is named 'Rat of the Cocoa-nut Palm,' that being its favourite haunt by day, nestling among the fronds; if disturbed, performing feats of agility, and darting from one palm to another. It will spring with great rapidity, adhering to any object as if it were a lump of wet clay. It has one failing; otherwise its capture were no easy task. Should a pot of palm-wine be left atop the tree, the creature drinks to excess, comes down, and rushes about intoxicated. In captivity they are wild, during the day remaining either rolled up in a ball or perched half asleep, with ears stowed, like a beetle's wing under the elytra. I had half a dozen squirrels with one in the same cage; these were good friends, the latter creeping under the 'Golgo's' soft fur and falling asleep. On introducing a few specimens of *Macroscelides tetradactylus*, the 'Golgo' seized one and bit off its tail, which, however, it did not eat. The food it took was biscuit, rice, orange, banana, guava, and a little cooked meat. Stupid during the day, it became active at night, or just after dark-

ness set in. The rapidity and length of its leaps, which were absolutely noiseless, must give great facilities to its capturing live prey. I never knew it give a loud call; but it would often make a low chattering noise. It has been observed at the Luabo mouth of the Zambesi, at Quillimane, and at Mozambique. When I had my live specimens at Zanzibar, the natives there did not seem to recognize it; nevertheless it may be abundant on the mainland.

“ Ever yours, very sincerely,

“ JOHN KIRK.”

This animal is most probably the *Otolicnus crassicaudatus*, described by Dr. Peters, from Quillimane; but his figure is very much darker, and in other respects very different from the one here described; at the same time, I am well aware how difficult it is to represent animals, especially when soft-furred like the Lemurs.

I have compared the skull in the flesh of *Callotis montieri*, from Angola, with the skull of *Otogale crassicaudata*, and, as far as I could see the skull under the flesh with which it is enveloped in spirit, the two skulls and the teeth are very much alike, the orbit of *Callotis* being, if at all, but very little larger.

##### 5. NOTE ON THE CLAWED TOADS (DACTYLETHRA) OF AFRICA.

BY DR. J. E. GRAY, F.R.S., ETC.

There has long been known a Toad that has long slender fingers to its fore feet, like the *Pipæ*, and very large webbed hinder feet, some of the toes of which are armed with very distinct horny black claws—a peculiarity of structure that is quite an exception amongst the Batrachian animals.

The specimen first observed was brought from South Africa: it was described and figured by Cuvier, in the second edition of the ‘Règne Animal’ (vol. ii. p. 107, t. 7. f. 3), under the name of *Dactylethra*. This author states that the animal had been before partially known; for it is figured, but without its claws, in the ‘Planches Enluminées’ as the male *Pipa*, I suppose on account of the form of the feet. Daudin described it under the name of the *Crapaud lisse* (t. 30. f. 1); and Merrem, in his Compilations, calls it *Pipa buffonia*. It is now generally known as the *Dactylethra capensis* of Cuvier.

Dr. Peters, when examining a specimen of this animal which he obtained from Mozambique, discovered a very small cylindrical appendage, or beard, situated on the front part of the underside of the orbit; and described it as a new species, under the name of *Dactylethra mülleri*, in the ‘Monatsber. der Berlin. Acad.’ (1844, p. 37).

Dr. Hallowell, having observed the same beard under the eyes of a young specimen which he had obtained from the Gaboon through Dr. H. A. Ford, gives a long description of it, under the name of *Dactylethra mülleri*, in the ‘Proceedings of the Academy of Natural Sciences’ for 1857, p. 65.

Dr. Günther, in his excellent 'Catalogue of Batrachia Salientia in the British Museum,' published in 1858, admits the two species, and appears not to have observed the minute beard under the eyes in the specimens from South and West Africa, then in the Museum collection; but when we received, in 1862, the specimen from Natal collected by Mr. Ayres, he named it the *D. mülleri* of Peters.

Professor Auguste Duméril, in his paper on African Reptiles, published in the 'Archives du Muséum,' vol. x. (1861), makes some observations on the distinction of the two species, and figures the head of *D. capensis* and the entire animal of *D. mülleri*, showing the little beard under the eyes in the latter figure and not in the former. He also makes the head of *D. capensis* more produced and narrowed in front than in his figure of *D. mülleri*; but I cannot see any such difference between the heads of the Cape and Western African specimens in the Museum collection.

I may observe that if these naturalists had examined specimens from South Africa, either near the Cape or even so far north as Natal, they would have found the same beard in the true *Dactylethra capensis*, showing that this beard, at least, is a character of the genus, and not a peculiarity of the Mozambique or West African specimens.

In several of the specimens the beard under the eyes, at least when it is preserved in spirits, varies in size on the two sides of the animal; and in one specimen it is scarcely visible on one side, and well developed on the other.

Dr. Peters also gives as a character of his *D. mülleri*, that it has a spur at the base of the first toe; and Dr. Hallowell observes that the specimen he had from Gaboon "differs from the *Dactylethra* of the Cape, more especially in the presence of a sharp-pointed spur projecting from the cuneiform bone, which is not observed in *Dactylethra capensis*."

Dr. Günther, in his 'Catalogue' (p. 2), also uses this spur as part of the specific character. He says—

*D. lævis*. "Tarsus and metatarsus without any tubercle or spur."

*D. mülleri*. "A spur at the base of the first toe."

Professor Auguste Duméril, in the paper before referred to, figures the feet of *D. capensis* (t. 18. f. 6, 6a) for the purpose of comparing it with the feet of the other figure (of *D. mülleri*), and observes, "On peut saisir ainsi des dissemblances fort évidentes des deux espèces" (p. 232), showing the spur very distinct in the latter, and not visible in the former,—in fact, making the figure agree with the characters assigned, as in the case of the beard under the eyes, rather than as they are in nature.

On examining the specimens from the Cape of Good Hope (collected by Sir Andrew Smith and Mr. Hunter), from West Africa (collected by Mr. Fraser and Mr. Welwitsch), and from Natal (collected by the Rev. H. Callaway and Mr. T. Ayres), I find they all have exactly the same kind of spur, which is least distinctly marked in the latter specimen from Natal, called *D. mülleri* by Dr. Günther;

but the distinctness of the spur appears to depend on the whole foot being larger and more plump, and it is more distinctly developed or prominent in the smaller than in the larger specimens.

The black horny claws which cover the last joint of the three outer toes and the spur of the hind foot are deciduous in spirits. Hence the spur may have been overlooked in specimens which have been long in spirits; and the distinctness of the spur greatly depends on the presence or absence of this claw. These black claws are to be seen on the youngest specimens as soon as the toes are developed.

The skin is scattered with small white lines dispersed in a symmetrical manner, which, when examined by a magnifier of rather high power, display linear series of close minute perforations or glandular openings. Dr. Hallowell seems to have observed some of these; for he mentions "the semilunar rows of longitudinal glands on the throat;" but he does not seem to have seen that they are symmetrically distributed over nearly the whole of the body, and especially on the head, the back, and the sides, as well as the throat. He specially observes that the skin is smooth, and that there is no lateral line visible.

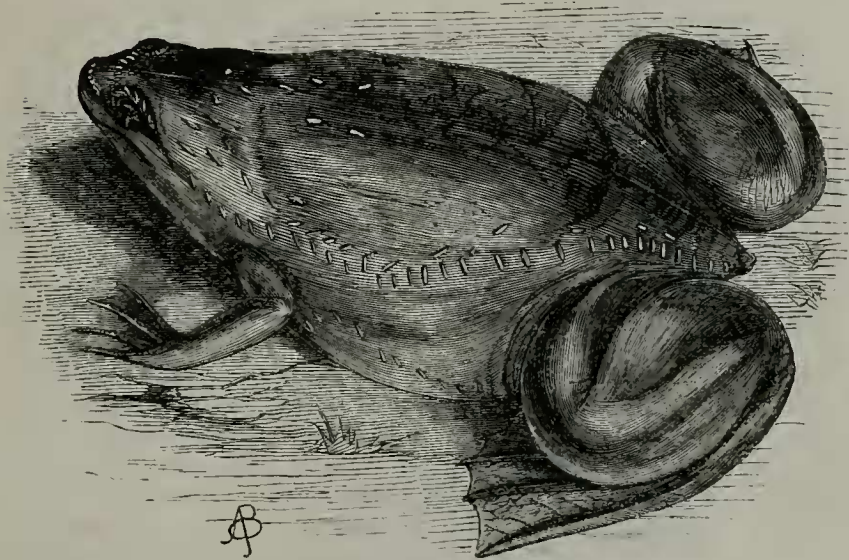
Professor Auguste Duméril does not take any notice of them in his short observations; but in his figure of *D. mülleri* (t. 18. f. 3) he represents the double series of them that surround the back like a double series of short prominences or tubercles, very unlike the sunken line of pores which they are—indeed so unlike that I should not have understood what they were intended to represent on this smooth-skinned Toad, had I not previously observed the glands, and if they were not placed exactly where the double line of pores is situated, and where there are no such prominences on the animal as his figure seems to represent.

I will now proceed to notice the distribution of the more important of these white glandular lines. There are two horizontal lines, slightly separated in the middle, at the end of the nose, under the nostril; a line between the eye and the nostril; and a series of oblique lines across the swollen band which surrounds the eye on the edge of the orbit; two rows of glands on the back of the neck, placed rather obliquely to each other, and some scattered ones on the outer side of them; two series of short lines from the middle of the temples, continued over the shoulder, along the sides, over the base of the thigh, to the upper surface of the vent; the upper line in these series is longitudinal, and the lower ones larger and transverse to the direction of the upper line. On the under parts there is a lunate series of arched linear glands across the throat and on each side of the body, commencing by an arched line round the back of the axilla, continued in a curved line, with the convex side of the curve downwards, along the side of the belly, and thence to the groin.

The disposition of these glands will appear to be of some importance in a zoological point of view when one studies the character of the genus *Silurana*. These glands, especially those on the under-side of the body, are much more distinct in some specimens than



they are in others; but I suspect this depends on the season when the specimen has been captured, and especially on the state and manner in which the specimen has been preserved.



The specimens in spirit rather vary in colour; but this may depend on the length of time that they have been in spirit, on the exposure to which they have been submitted, and on the strength of the spirit in which they were originally preserved.

The specimens of an adult male and female from West Africa, presented by Mr. Welwitsch, are of a uniform olive-brown above and yellowish below, marbled with very distinct, unequal-sized, subsymmetrically distributed olive spots.

The specimen from the Cape, presented by Sir Andrew Smith, which is in a rather soft state, is olive obscurely spotted above, pale whitish grey beneath, obscurely marked with small darker spots.

The adult specimen from Natal, collected by Mr. Ayres, and the smaller specimen from West Africa are of a uniform olive-brown above and pale grey-brown beneath, without any indication of spots.

Mr. R. B. N. Walker (to whom we are indebted for the best account of the habits of the Gorilla, and who has brought to England some most interesting animals from Western Africa) has lately been living at Lagos, where he observed some Tadpoles that were developed in abundance in a pond adjoining his residence. He put some of these in spirits, and gave them to the Free Museum at Liverpool. Mr. Moore having kindly sent me some of these specimens for examination, I was soon convinced that they had not before been observed, and therefore sent a short notice of them to the 'Annals and Magazine of Natural History' for September 1864, and named them, from their resemblance to the genus *Silurus*, *Silurana tropicalis*.

Some naturalists having expressed a doubt if the animals sent

home by Mr. Walker were not the young of the common *Dactylethra* (an opinion that I entertained myself when I first saw them, and until I had compared them with the papers on the subject), I have been induced to reconsider the question, and to study the genus. This study has led me to the conclusion that the two geographic species of *Dactylethra* are but one, which is spread over the whole of South and Western Africa; and also to retain the opinion that I have published, that the specimens brought by Mr. Walker from Lagos are probably of a distinct form. I will not take on myself to deny that they may not be the larva of *Dactylethra*, as the larva of that genus and the adult form of *Silurana* are unknown; but even if it is proved hereafter that they are only the larva of *Dactylethra*, I think that it is better for the present to keep them separate, until the change from one state to the other has been observed and recorded, and, at all events, that the description and observation of the larva is an important addition to the history of the genus.

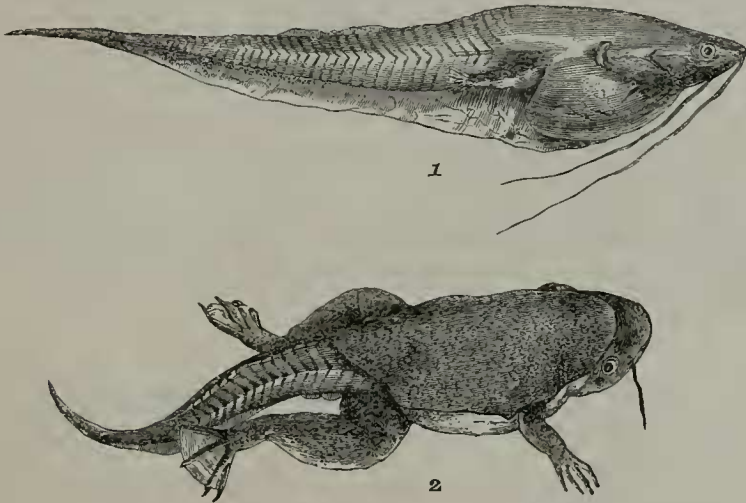
It would be a remarkable change, if the large beard that is placed at the angle of the mouth in one genus should turn into the minute beard on the lower edge of the orbit, far above and in front of the angle of the mouth, in the other; yet I am assured by an experienced herpetologist that he believes that this change does take place, and that it is only consistent with what is to be observed in the transformation of other Batrachians. No such changes have occurred to me. There is no doubt that the beard at the angle of the mouth is much longer and more slender in the young larva than it is in the oldest specimen we yet possess of the genus *Silurana*. But while the beard diminishes in length, it increases considerably in thickness, showing no inclination to disappear, and does not at all alter its place in any of the specimens I have observed either in the British Museum or at Liverpool.

The least-developed fish-formed specimen (fig. 1) is about  $2\frac{1}{2}$  inches long, and has only the hinder pair of legs developed. The legs are short and weak; and the toes are short and of nearly equal length, but with the three black claws well developed. The head is depressed, very broad and flat above, and shelving to near the back behind. The mouth is small, with a very long slender beard on the upper lip, at the angle of the mouth. The eye is on the keel on the side of the head, considerably behind the beard, placed so as to be visible from the upper and lower surface. The body is swollen; the tail compressed; the inferior fin commences in the middle of the belly, and is extended to the end of the tail.

There is a second fish-formed specimen, not more than 2 inches long and much more slender, which also has the front limbs developed, from the upper part of the sides; these limbs are weak, and the toes are short and equal. The hinder limbs are rather more developed, their toes rather more unequal; and the fin on the under part of the body and tail is also broad and more membranaceous. The mouth, beard, and eyes are exactly as in the former specimen.

The other two specimens (fig. 2) have assumed the form of the genus *Dactylethra*, having both the fore and hind limbs well deve-

loped, the eye on the side of the head only visible from the upper surface; but they have a well-developed tail attached to their bodies, with a very narrow, thin inferior membrane. The nose is blunt, rounded at the sides. The mouth small, the beard well developed at the angles. The eyes are far behind the angle of the mouth, and without any appearance of a small beard on the under part of the orbits. These specimens have a very distinct spur, covered with a black claw, at the inner side of the base of the hind foot.



I am willing to admit that there are some facts which might induce one to believe that these animals may prove to be the larva of *Dactylethra*; and, as truth is my only object, I think it right to state them, though they may only be similarities that are common to the two genera of the same family.

1. There is a small, white, round, prominent dot on the side of the nose in front, nearly on a level with the lower part of the orbit, which appears as if it might develope itself into the orbital beard of *Dactylethra*; and I think this much more likely to be the case, than that the beard of the angle of the mouth should become the suborbital beard.

2. There are the same double rows of glands which I have described as found in *Dactylethra*; but in these young animals they have a very peculiar appearance. On the forehead, rather in front of the eyes, there is a transverse groove, which is continued over the eyes, the base of the fore legs, along the side to the groin, and then bends up again, and becomes united to a similar groove on the upper surface of the body, which circumscribes an oval well-marked disk or shield that covers the back. The two rows of glands above described are placed on the margin of this shield. The glands are visible in the adult *Dactylethra*, but the disk is not distinguishable.

The disk is not distinguishable, except as a slight thickness on the back of the base of the tail, in the two fish-shaped larvæ. This shield is peculiar; it would almost seem to show that there is a certain affinity, or analogy, between the Toads and the Chelonians, or rather the freshwater Emydians.

#### DACTYLETHRIDÆ.

Head depressed; upper jaw toothed; tongue none; eyes with an inferior lid; orbits swollen, marked with transverse oblique white lines of minute pores. The Eustachian tubes united into one pharyngeal orifice. Skin smooth. Head and body with white lines of minute pores, symmetrically disposed. The back with a more or less distinct dorsal shield, commencing on the temples, and continued to the upper part of the base of the tail, marked by two series of short white lines of minute pores (the outer transverse and the inner longitudinal), and a more or less raised edge. The fore feet with four subequal tapering free toes. The hind feet with five elongated, rather unequal toes broadly webbed to the tips, the three outer toes and the spur on the outer side of the ankle furnished with black conical horny claws.

#### 1. DACTYLETHRA.

The dorsal shield indistinct, only marked by the double series of glands. Mouth large, not bearded. Orbit with a small beard on the under edge.

*D. CAPENSIS*, Cuvier. *D. lævis*, Günther. *D. mülleri*, Peters, Hallowell, Duméril.

*Hab.* South and South-eastern Africa.

#### 2. SILURANA.

The dorsal shield very distinct, with a raised edge, and separated by a groove on the forehead. Mouth small, with an elongated beard on each side at the angle of the gape. Orbit without any beard. The larva fish-like; head flat, broad, truncated; mouth small, two-bearded; eyes in the keel of the side, shown above and below; body swollen; tail elongate, compressed; the belly and underside of the tail with a broad, membranaceous fin continued to the end of the tail.

*S. TROPICALIS*, Gray, Ann. & Mag. N. H. ser. 3, vol. xiv. p. 316.

*Hab.* Lagos (*R. B. N. Walker, Esq.*).









G. H. Ford.

W. West imp.

1. *Ensirostris melleri*. 2. *Sauroceras rhinocerotum*.



6. REVISION OF THE GENERA AND SPECIES OF CHAMÆLEONIDÆ,  
WITH THE DESCRIPTION OF SOME NEW SPECIES. BY DR.  
J. E. GRAY, F.R.S., F.L.S., ETC.

(Plates XXXI., XXXII.)

The Chameleons form one of the most natural family of Lizards, as well as one of the most clearly defined. The distinction of the species from one another, as is almost always the case in a natural group, is difficult, and requires careful study and consideration. The species in general are well marked when the characters are eliminated; but there are a few species, as *Chamæleon vulgaris* and *C. senegalensis*, which have a broad geographical distribution, that offer several variations such as, if the differences did not appear gradually to pass into each other, might induce one to believe that they were specific; but they can hardly be even considered as local varieties, for the same variation seems to occur in specimens from different localities often situated far apart.

There is considerable difference in the sexes, especially of the horned species which, I believe, was first established in my 'Monograph;' but this difference does not appear to be common to all the species of the Horned Chameleons; for while the female of *C. owenii*, *C. bifidus*, and *C. parsonii* are hornless, the expansions on the sides of the nose of *C. pardalis*, which are analogous to the horn in *C. bifidus*, are as much expanded in the adult female as in the males of that species.

The female specimens are much more common in museums than males; they are perhaps more easily caught when they come to the ground to deposit their eggs: and this appears more probable from the fact that females containing eggs are often to be found among those collected. In some cases, even where there is a series of specimens, they are all females; at least I have not, from the external appearance, been able to discover a male of *C. senegalensis* or *C. dilepis*.

Dr. Hallowell (Journ. Acad. Nat. Sc. Philad. vii. 99) thought at one time that the occipital lobes were peculiar to the females; I also was once inclined to believe this might be the case, before I had seen his remark, from observing that all our specimens of *C. dilepis* appear to be females; but I had the same difficulty in finding any males of *C. senegalensis* or other allied species; and M. A. Dumeril specially observes that "the cutaneous prolongation is not a character only of the female *C. dilepis*" (Arch. du Mus. x. 174).

There is considerable variation in the distinction and height of the occipital crest in the specimens of *C. vulgaris* and in some other species. This often arises from the animals having been kept in confinement without (or with only a very limited supply of) food, until the muscles have shrunk. This should make one careful in using the height of the crest as a character, more especially as many of the specimens in museums have been kept alive in confinement either in the country which they naturally inhabit or in some other, as collectors like to have them alive as pets.

Yet the well-fed and fresh-caught specimens seem to vary considerably in this particular; for example, specimens of *C. vulgaris* from India, as a rule, seem to have the occipital crest higher and more arched than African specimens; but still there are in the Museum collection some African specimens which have quite as high crests.

Little attention seems to have been paid to the coloration of the species, probably because the animal greatly changes its colour during life; and specimens in spirits of some species, such as of *C. vulgaris*, offer many variations, from bright yellow to dark lead-grey. Yet in some species the distribution of the colours, at least in specimens in spirits, seems to form permanent specific marks, as, for example, the lines or white spots or white bands on the sides of several species.

The number of species has gradually increased. In my Monograph, published in the 'Catalogue of Lizards in the British Museum,' printed in 1845, I described eighteen species; the present revision contains thirty, distributed into fourteen genera.

Since the above Monograph, Dr. Hallowell has described three or four species from West Africa, in the 'Journal' and 'Proceedings' of the Academy of Natural Sciences of Philadelphia; but unfortunately I have not been able to make any of the specimens in the Museum collection agree with his descriptions. M. A. Duméril, in the 'Archives du Muséum,' has described and figured two new species, and he has given figures of the heads of fifteen other species. I have referred to these figures, as they elucidate several species described in my Monograph which had not before been figured. Unfortunately the figures are not as accurate as they might be; and one, that of *C. cucullatus*, is either absolutely erroneous or is from a Chameleon that differs very considerably in the proportion of the head, and in having a dentated crest on the chin, from the species to which M. A. Duméril has referred it, which was originally described by me from specimens in the British Museum collection—the account in the 'Erpétologie Générale' having been copied from my description.

Dr. Andrew Smith, in the fifth number of the 'South-African Quarterly Journal,' published at the Cape of Good Hope in October 1831, describes two new species, viz. *C. namaquensis* and *C. tænia-bronchus*; and in the Appendix to his 'Zoology of South Africa,' 1849, he describes a third, under the name of *C. gutturalis*. I have not been able to identify the two latter.

Dr. Fitzinger, in his 'Systema Reptilium,' published at Vienna in 1843, is the only author, as far as I know, who has attempted to divide the Chameleons into genera. He separates the family into two genera—*Chamæleon*, with homogeneous, and *Bradypodium* with heterogeneous scales. The rest of the lengthened characters which he gives for the genera are only transcripts of one another. He divides the first genus into three sections, viz. *Chamæleon*, *Triceras*, and *Furcifer*. The genera and the sections consist of species which have very little affinity, and appear to be very incongruously associated together: for example, *Furcifer* consists of *C. bifurcus*, *C. parsonii*,

and *C. brookesii*; and *Bradypodium* of *C. pardalis*, *C. verrucosus*, *C. pumilus*, and *C. cucullatus*. The species are not characterized, except by the synonyms appended. It appears that he divides *C. vulgaris* into four, and *C. senegalensis* into two species.

The species have hitherto, except in the instance of Fitzinger above cited, all been referred to a single genus, in which they have been generally arranged in an artificial manner, merely to facilitate the finding of their names.

The species throw themselves into groups agreeing in natural characters: these groups are quite as distinct as the groups in the other families, which are regarded as genera; I have therefore so regarded them. If a comparison of genera of different families is to be established, and their affinities to each other studied, the genera in the different families should be formed on the same plan.

The Chameleons are essentially confined to Africa and the islands near to that continent. Thus, as far as we at present know, the following species, *Chamæleon calypttratus*, *C. verrucosus*, *C. balteatus*, *Apola lateralis*, *Calumma cucullata*, *Crassonota nasuta*, *Sauroceras rhinocerotum*, *Dicranosaura bifurca*, and *D. parsonii*, are confined to Madagascar; *Cyneosaura pardalis* to the Isle of Bourbon; *Lophosaura tigris* to the Seychelles; *C. burchelli*, *Pterosauria cristata*, and *Tricerias owenii* to Fernando Po and perhaps Old Calabar; *C. gracilis* to West Africa—Liberia; *C. petersii* to Mozambique; *Ensirostris melleri* to Eastern Africa; *C. auratus* to Arabia; *C. granulatus*, *Brookesia superciliaris*, and *C. senegalensis* to W. Africa; *C. lævigatus* to Central Africa; *C. affinis* to Abyssinia; *Phumanola namaquensis* to South-east Africa; *Lophosaura pumila* and *L. ventralis* to South Africa. *C. dilepis* is common to the west and south-east coast of Africa; while *C. vulgaris* is distributed over North and South Africa, Asia Minor, India, and Singapore.

Fam. CHAMÆLEONIDÆ, Gray, Cat. Lizards Brit. Mus. 264 (1845).

#### CHAMÆLEON, Gronovius, Fitz.

##### *Synopsis of the Genera.*

##### A. *The nose and orbit simple, not horned.*

1. CHAMÆLEON. Back and belly with a series of compressed elongated scales.
2. APOLA. Back-edge broad, with two series of minute scales; belly dentated.
3. PTEROSAURUS. Back and tail with a high fin, supported by bony rays, smooth-edged; belly dentated.
4. MICROSAURA. Back and chin crested; occiput keeled, compressed; sides smooth, divided into two square disks.
5. PHUMANOLA. Back rounded, with a series of large bony tubercles covered with scales.

6. **LOPHOSAURA.** Chin with a series of elongated processes covered with scales.
7. **CALUMMA.** Orbit with large lobes, covered with scales behind; back dentated; belly and chin rounded, not dentated.

B. *Nose simple; orbit angularly produced in front.*

8. **BROOKESIA.**

C. *Nose and orbit with cylindrical horns, covered with a sheath.*

9. **TRICERAS.** Horns, one on the nose and one on the front of each orbit.

D. *Nose with one or two bony prominences covered with scales.*

10. **CRASSONOTA.** Nose compressed in front, with a flexible compressed lobe covered with scales; back with a distant series of slender elongated scales.
11. **ENSIROSTRIS.** Nose-horn single, bony, central, sharp-edged above; occiput lobed behind; back with a lobed, erect fin.
12. **SAUROCERAS.** Nose-horn single, bony, central, sharp-edged below, grooved above; occiput simple behind; back dentate.
13. **DICRANOSAURA.** Nose-horns two, produced, compressed; back compressed; belly and chin rounded.
14. **CYNEOSAURA.** Nose dilated, and toothed on each side in front; back, chin, and belly dentate.

A. *Nose of male and female simple, not dilated; orbit simple.*

1. **CHAMÆLEON.**

Nose (of both sexes) simple, without any appendages or horns; the chin simple; orbit round, simple. The back, chin, and belly with a series of compressed elongated scales, forming a dentated crest.

a. *Occiput produced and acute behind, with raised central keel, with small scales behind the temples.* Calyptosaura.

1. **CHAMÆLEON CALYPTRATUS**, A. Dum. Arch. du Mus. vi. t. 21. f. 1.

The occipital ridge very high and large; scales equal, small.

*Hab.* Madagascar (*Mus. Paris.*).

I only know this species from the description and figure of M. A. Duméril.

2. **CHAMÆLEON VERRUCOSUS**, Gray, Cat. B. M. 267; Dum. & Bib. Erp. Gén. iii. t. 27. f. 1. B.M.

*Bradypodium verrucosum*, Fitz. Syst. Rept. 43.

Scales unequal; sides with several series of larger tubercles.

*Hab.* Madagascar. Males and females similar.

The series of scales on the belly and chin becomes less distinct in the older specimens.

- b. *Occiput produced and acute behind, with a raised central keel and with a flat space edged with a series of large scales, from the apex to the sides of the temple.* Chamæleon.

3. CHAMÆLEON VULGARIS, Gray, Cat. B.M. 265; A. Dum. Arch. du Mus. vi. t. 22. f. 1 (head). B.M.

The occipital crest moderate, upper edge arched; the side margin with a series of large scales, and more or less elevated; scales equal.

In spirits, brown, with two more or less interrupted pale longitudinal bands on each side; eyelids dark-rayed.

*Hab.* Africa and Asia; and naturalized in Europe.

Var. *marmoratus*. Forehead very concave; eyebrows and occipital crest very high. In spirits, pale brown, marbled with irregular black cross marks.

*Hab.* Dukhun (*Col. Sykes*).

In the British Museum there are specimens from S. Europe (*P. B. Well*); N. Africa, Egypt (*J. Burton*), Algiers and Tunis (*Fraser*), Tripoli (*Ritchie*); S. Africa (*Col. Denham*); Asia Minor, Xanthus (*Fellows*); India, Calcutta (*Hardwicke, Livesay*), Dukhun (*Sykes*), Anamallay Mountains (*Beddome*), Singapore (*Cantor*); Japan (*Zool. Soc.*).

After a most careful comparison, I have not been able to discover any distinction between the African and Asiatic specimens. The Asiatic ones have the bands on the sides less marked; indeed they are generally absent, but in some specimens they are clearly indicated. I was much tempted to separate them on this ground; but this character, and the height of the occipital crest, would not hold out after a rigorous examination and comparison.

Fitzinger, in his 'Systema Reptilium,' gives the names of *C. coromandelicus* to the Chameleon of India, *C. africanus* from Africa, *C. rimulosus* to that from Egypt, and *C. hispanicus* to that from Spain; but these species, or presumed species, are not characterized.

#### 4. CHAMÆLEON AURATUS.

B.M.

The scales large; dorsal, chin, and ventral crest well developed. The occiput extended and rather pointed behind, covered above with rather convex scales. The dorsal ridge is strongly toothed.

In spirits, pale yellow, with many bright yellow spots, and without any white spots or bands.

*Hab.* Arabia (*H. Christy*).

There is a second specimen, allied to this Chameleon, in the Museum collection, which differs in the occipital keel being very much lower and flatter; but in other respects they are very much alike. The one with the flatter occipital keel was received from the Zoological Gardens, and was said to have been sent from Mexico.

- c. Occiput produced and acute behind, with a distinct central keel, with large hood-like occipital flaps, from apex to side of the temple, covered with flat scales.

5. CHAMÆLEON PETERSII, n. s.

B.M.

*C. dilepis*, Peters, MS.

Back compressed, with a series of large compressed scales; forehead narrow, covered with flat scales with a strong sharp edge on each; occiput contracted and short-edged behind, with a well-raised central keel arched on its upper edge; occipital flaps broad, rounded, covered with large, flat, hexagonal scales; scales small, equal; chin and belly dentated, covered with flat scales.

In spirits, dark green, with a white spot behind the temple, and also a white streak from the axilla; forehead, temple, and side of occiput white.

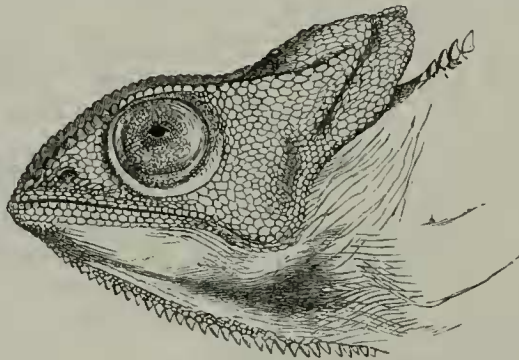
*Hab.* E. Africa, Mozambique (*MacLeod, Dr. Peters*).

Var. *kirkii*. The occipital lobes smaller.

B.M.

*C. dilepis*, Gray, P. Z. S. 1864.

*Hab.* Eastern Africa (*Dr. Kirk*). A female.



*Chamæleo petersii*.

- d. Occiput produced and acute behind, with a low keel, and two large broad flaps behind, covered with large, irregular, convex shields; scales of body and limbs with larger tubercles.

6. CHAMÆLEON MONACHUS. (Pl. XXXI.)

B.M.

Brown (in spirits), dorsal keel and body white-speckled, upper and lower lip at the gape and ventral crest white; the occipital flaps large, with irregular, unequal, flat shields; the body and limbs with low, convex, larger tubercles.

*C. cucullatus*, A. Duméril, Arch. du Mus. vi. t. 6. f. 9 (not Gray).

*C. parsonii*, Cat. Mus. Zool. Soc. MS.

*Hab.* Madagascar.

The head of this species is not well figured as that of *C. cucullatus* by M. A. Duméril. It is at once known from that species

by the form of the occiput, and the crest on the chin and belly. It is a fine large species. We received it from the Zoological Society in 1855.

e. *Occiput broad and rounded behind, flat above, with a scarcely raised central line behind.*

† *The sides of the occiput with small granular scales.* Erizia.

\* *Chin and belly with a distinct denticulate line of white scales.*

7. CHAMÆLEON SENEGALENSIS, Gray, Cat. B. M. 286; A. Dum. Arch. du Mus. vi. t. 22. f. 7 (fig. bad); Fitz. Syst. Rept. 41. B.M.

? *C. leptopus*, Fitz. Syst. Rept. 41.

Scales large; head broad and rounded behind; occiput covered above with convex scales.

In spirits, brown or purplish.

*Hab.* West Africa, Senegal (*Earl of Derby*).

8. CHAMÆLEON LÆVIGATUS, Gray, P. Z. S. 1863; Ann. & Mag. N. H. 1863, xii. 248. B.M.

Scales minute; the dorsal crest very indistinct, only visible on the nape; head rhombic behind; occiput covered above with flat thin scales.

*Hab.* Central Africa, Chartoom (*Petherick*).

Probably only a young specimen of the preceding.

9. CHAMÆLEON GRACILIS, Hallowell, Journ. Acad. N. S. Philad. viii. 324, t. 18 (♀ and eggs); Proc. Ac. N. S. Philad. 1854, 99; A. Dum. Arch. du Mus. x. 173 (a note only). B.M.

*C. senegalensis*, var., Gray, Cat.

Scales large; head broad and acute behind; occiput covered above with convex scales.

In spirits, olive, with a white spot on the shoulder, or interrupted on the upper part of the back, and with a band of white spots from the axilla.

*Hab.* W. Africa, Senegal (*A. Gerrard*), Angola, Congo, Cuanga, and Pungo Adongo (*Dr. Welwitsch*), ? Liberia (*Dr. Ford*).

Var. ? *leiocephalus*.

B.M.

Scales and colour like the former; the scales on the crown and occiput above flat, smooth, hexagonal.

*C. dilepis*, Gray, Cat. Mus.

*Hab.* W. Africa, Fantee (*Capt. Marryat*), Ashantee (*Mus. Leyden*).

The figure of Dr. Hallowell is a moderately good representation of this species; but the name is not the best, as it is a stouter and stronger species than *C. senegalensis*.

\*\* *Chin without any white dentated ridge of scales ; belly dentated.*

10. CHAMÆLEON AFFINIS, Rüppell ; Gray, P. Z. S. 1863 ; Ann. & Mag. N. H. 1863, xii. 248.

*C. abyssinicus*, Wiegmann, Mus. Berolin. ; Fitz. Syst. Rept. 43.

Lead-coloured (in spirits), with two white long spots on the temple behind the eyes, upper part of back with an interrupted broad white band ; scales large, subequal.

*Hab.* Abyssinia, from Mus. Francofort.

\*\*\* *Chin dentated ; middle of belly not dentated.*

11. CHAMÆLEON BALTEATUS, A. Dum. Arch. du Mus. vi. 260, t. 21. f. 2 ; x. 174.

Back dentated ; scales subequal, brown ; edge of jaws, middle of the belly, and tail, a broad oblique streak from shoulder to groin, and a streak on each side of the belly yellowish ; chin slightly dentated ; "middle of the belly not dentated" (Arch. Mus. x. 174).

*Hab.* Madagascar (*Mus. Paris.*). A single specimen. I have not seen this species.

The following species appear to belong to this division :—

12. CHAMÆLEON GRANULOSUS, Hallowell, Proc. Acad. N. S. Philad. 1856, 147.

Grey ; belly bluish ; scales on the sides unequal, tubercular ; four or five rows of flat quadrangular scales between the dorsal denticulations and the lateral tubercles.

*Hab.* West Africa (*Mus. Philad.*). A single specimen.

13. CHAMÆLEON BURCHELLI, Hallowell, Proc. Acad. N. S. Philad. 1856, 147.

Greenish, with a lateral yellow stripe ; scales of body unequal, tubercular, subrhomboid, interspersed with very small granules ; of sides of head, rather large, flattened.

*Hab.* Fernando Po (*Mus. Philad.*). A single specimen.

†† *Sides of the occiput with a fleshy lobe, covered with scales from the apex of the occiput to the middle of the temple.* Dilepis.

14. CHAMÆLEON DILEPIS, Leach ; Gray, Cat. B. M. 266 ; A. Smith, Zool. S. Africa, App. 3 ; A. Dum. Arch. du Mus. vi. t. 22. f. 8 (not good). B.M.

*C. bilobus*, Kuhl ; Fitz. Syst. Rept. 41.

Dorsal crest of a single series of short conical scales ; scales of body conical, convex, of crown and forehead flat, larger.

In spirits, bluish brown, a short white streak at angle of mouth, and a white band from the axilla along the sides of the belly, and another over the shoulder.



*Hab.* West Africa (*Richardson*), Gaboon (*Bowdich*), the type specimen described by Dr. Leach; S. Africa, Latakoo (*A. Smith*), Port Natal (*Rev. H. Calloway, Ayres*).

## 2. APOLA.

Nose of both sexes simple; orbit rounded. Chin and belly dentated. Back compressed; upper edge flat, with a series of minute scales on each side. Occiput keeled. Scales granular, equal.

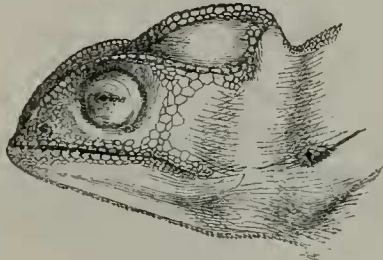
### 1. APOLA LATERALIS.

B.M.

*Chameleo lateralis*, Gray, Cat. B. M. 264; A. Dum. Arch. du Mus. vi. t. 22. f. 6 (head).

Pale brown, with a narrow, continued pale streak on the middle of the sides; ventral line white.

*Hab.* Madagascar.



*Apola lateralis.*

## 3. PTEROSAURUS.

Nose and chin simple. Back and tail with a high crest, supported by long bony rays. Belly slightly dentated. Chin and back smooth-edged. Orbit rounded. Occiput much produced, sloping, acute behind, flat above, or rather concave, without any central ridge; hinder sides covered with very small scales. Scales small, with scattered larger ones.

### 1. PTEROSAURUS CRÍSTATA.

B.M.

*Chameleo cristatus*, Gray, Cat. B. M. 264.

Sides with a series of larger circular scales.

In spirits—red-brown, with numerous large, equal, roundish, white spots.

*Hab.* Fernando Po; Old Calabar (*Murray*).

One of the Museum specimens has two dark spots in front of the upper part of the nose over the nostrils. Is this a sexual character?

## 4. MICROSAURA.

The occiput much narrowed and compressed behind, flat above, with a slightly raised central keel; the side of the occiput with a smooth space, separated from the smooth temple by a central nodulous

ridge (as in *Lophosaura*). Back and chin with a crest of small compressed scales. Belly not dentated. Scales of body unequal; of legs equal, flat.

1. *MICROSAURA MELANOCEPHALA*.

B.M.

White (in spirits), head and shoulders black, fore legs blackish; scales of the body granular, small, convex; with a longitudinal series of large, circular, slightly raised tubercles on the middle of each side, and with a similar series of small tubercles on the sides of the middle of the back; scales of the legs larger than those of the body, flat, equal.

*Hab.* S. Africa, Port Natal, 1862.



Head of *Microsaura melanocephala*.

5. *PHUMANOLA*.

Nose and chin simple. Back with a series of large bony tubercles covered with scales. Orbit very prominent, rounded. Occiput triangular, with a central nodulous ridge; small convex scales. Scales uniform, convex. Forehead, crown, and back of chin and belly not toothed. Tail cylindrical, rounded above.

1. *PHUMANOLA NAMAQUENSIS*.

B.M.

*Chamæleo namaquensis*, A. Smith, Zool. Journ. 1831; A. Dum. Arch. du Mus. vi. t. 22. f. 3\*.

*C. tuberculiferus*, Gray, Cat. B. M. 267.

In spirits, dark brown, paler below; sides black-spotted, with a series of irregular-shaped, black-edged, pale spots along the middle; belly with a dark-edged, central, broad longitudinal band.

*Hab.* S. Africa—Little Namaqua Land, near the mouth of the Gariep or Orange River (*A. Smith*).

6. *LOPHOSAURA*.

Nose simple, without appendages. Chin with a series of skinny lobules beneath. Occiput produced, acute behind, keeled above. Back and throat often dentated. Scales unequal. Belly not toothed.

a. *Back compressed, with a continuous series of large compressed scales; scales unequal.* *Lophosaura*.

1. *LOPHOSAURA PUMILA*.

B.M.

*Chameleo pumilus*, Gray, Cat. B. M. 269; A. Dum. Arch. du Mus. vi. t. 22. f. 5.

*Bradypodium pumilum*, Fitz. Syst. Rept. 43.

Scales of body and limbs moderate, unequal, with one or two series of large scales on the sides; sides of occiput and temples covered with flat scales.

In spirits, bluish, with a white streak from the orbit to the shoulder, and from the temples along the sides of the back.

*Hab.* South Africa; Cape of Good Hope.

Var. *fordii*. Scales larger, more acute; tubercles on the side of the back large, elongate, keeled; throat-fringe elongate, covered with acute scales; scales of belly small, equal.

*Hab.* S. Africa, on branches of underwood; from Haslar Hospital.

*Trup sutchees* of the Cape Colonist; that is, "Tread lightly."

## 2. LOPHOSAURA VENTRALIS.

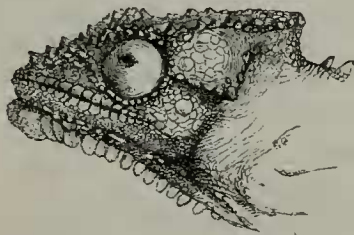
B.M.

*Chameleo ventralis*, Gray, Cat. B. M. 268.

*C. pusillus*, var.?, A. Smith, S. A. Zool. App. 2; A. Dum. *l. c.* 261.

Scales small, with three or four series of large, flat, oval scales, with convex centres, on the sides, and several series on the sides of the belly, and two series on the sides of the tail.

*Hab.* S. Africa. Male and female.



*Lophosaura ventralis*.

b. *The back with a series of distant conical compressed scales; tail and belly not crested.* Archaius.

## 3. LOPHOSAURA TIGRIS.

B.M.

*Chameleo tigris*, Gray, Cat. B. M. 268; A. Dum. Arch. du Mus. vi. t. 22. f. 3.

Scales of temple, occiput, back, and limbs uniform, small, granular.

In spirits, yellow, brown-spotted; spots sometimes confluent, forming short longitudinal lines.

*Hab.* Seychelles Islands.

*Chamæleo gutturalis*, A. Smith, Append. Z. S. A. 3.

"Back and tail surmounted with three rows of three-sided tubercles; body and tail covered with small scales and subconic tubercles; sides with two longitudinal rows of large subovate flat plates; chin and throat fringed longitudinally with long, small, thin, narrow and pointed lobes of skin. Length  $6\frac{1}{2}$  inches.

"*Hab.* S. Africa.

"Distinguished from *C. pumilus* by the length of the lobes of the

guttural fringes, and their being smooth and destitute of granular scales."

We have no specimen of this genus which has the scaleless lobes of the chin as here described.

*Chamæleo tæniabronchus*, A. Smith, S. Afr. Quart. Journ. 1831, p. 17.

"Yellowish green, with two longitudinal buff stripes along each side, and four or six smooth, oblong, jet-black stripes along the sides of the throat, best seen when the animal inflates itself, or when the skin is extended laterally; occipital casque narrow, produced, armed above with three dentated ridges, one on each side, and another along the centre; back with a ridge of short conical tubercles, inclined backwards; chin and throat with a short, dentated longitudinal fringe; scales of the body small and granular; temples divided longitudinally by a dentated ridge.

"*Hab.* Algoa Bay. One specimen,  $4\frac{1}{4}$  inches long."

## 7. CALUMMA.

Nose and chin simple; orbits rounded. Occiput lozenge-shaped, produced behind, and shelving on the sides, with very large flaps on the hinder side edges. Back compressed, with a series of compressed conical scales. Chin and belly rounded, not dentated, without any line of conical scales (female).

### 1. CALUMMA CUCULLATA.

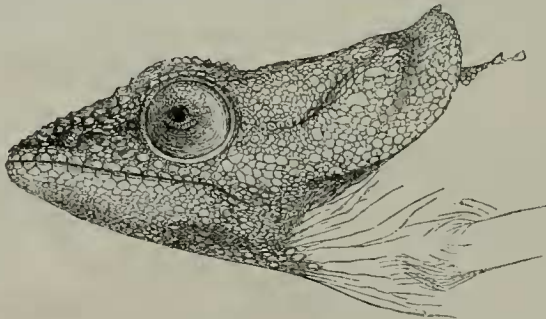
B.M.

*Chamæleo cucullatus*, Gray, Cat. B. M. 267.

*Bradypodium cucullatum*, Fitz. Syst. Rept. 43.

*Hab.* Madagascar. A single female specimen.

A. Duméril (Arch. du Mus. vi. t. 22. f. 9) figured a "*C. capuchon*" with a well-marked dentated line of scales on the chin. It is a very distinct species. Described above (at page 470) as *C. monachus*.



*Calumma cucullata.*

B. Nose simple; orbit angularly produced in front.

## 8. BROOKESIA.

Nose of both sexes simple. The eyebrows produced above into

triangular horns. Scales very minute. Chin, back, and belly not toothed; the sides of the back with a longitudinal series, and the chin with an arched series, of subulate erect scales. Tail short, compressed at the base.

1. BROOKESIA SUPERCILIARIS.

B.M.

*Chamæleo superciliaris*, Kuhl.

*C. brookesianus*, Gray, Cat. B. M. 270; cop., A. Dum. Arch. du Mus. vi. t. 22. f. 14.

*Chamæleon brookesii*, Fitz. Syst. Rept.

*Hab.* West Africa.

*C. Nose and orbit of male with cylindrical horns.*

9. TRICERAS.

*Chamæleon*, § *Triceras*, Fitz. Syst. Rept. 43.

The nose of the male with three horn-like processes, covered with a conical, continuous, horny sheath—one from the front of each orbit, and the other from the middle of the nose. Chin simple. Back, chin, and belly not crested. Occiput flat, with a slightly raised central line. Scales uniform, granular.

1. TRICERAS OWENII.

B.M.

*Chameleo owenii*, Gray, Cat. 269; Zool. Misc. t. 4; cop., A. Dum. Arch. du Mus. vi. t. 22. f. 10 (head).

♀. *C. bibronii*, Martin.

*Chamæleon owenii*, Fitz. Syst. Rept. 102.

Dark brown in spirits, with several series of oval longitudinal spots; those on side of back forming a pale band; eyelid dark-rayed.

*Hab.* Fernando Po (*Capt. Edw. Owen*).

*D. Nose with one or two bony processes covered with scales; orbits simple, unarmed.*

10. CRASSONOTA.

The nose (of male?) compressed in front, with a flexible compressed lobe covered with scales. Chin simple; orbit rounded. Back rounded, with a series of small, distant, slender, flexible, single scales. Chin and belly rounded, not dentated. Tail rounded above. Occiput flat above, produced behind, shelving on the sides, and covered with small scales. Scales equal, thin.

1. CRASSONOTA NASUTA.

B.M.

*Chameleo nasutus*, Gray, Cat. B. M. 268; A. Smith, Zool. S. Africa, App. 3; A. Dum. Arch. du Mus. vi. t. 22. f. 4 (head bad).

*Chamæleon nasutus*, Fitz. Syst. Rept. 42.

Pale brown; belly paler; head and limbs white-spotted.

*Hab.* Madagascar.

Var. "With three isolated spines, each about a line in length, on

the vertebral line, about midway between the head and the base of the tail.

“*Hab.* Eastward of Port Natal.

“Length: head and body 1 inch 10 lines; tail 1 inch 9 lines. Appears to be an adult.” (*A. Smith*, l. c.)

### 11. ENSIROSTRIS.

Nose (of male, at least) with a single central compressed bony horn, sharp-edged above. Orbit rounded. Chin and belly simple, not dentated. Back and tail with a high crest of roundish lobes covered with scales. Occiput keeled, acutely produced behind, shelving on the sides, and with a broad hood-like lobe covered with scales on each side behind; scales unequal, granular, with larger rounded scattered tubercles.

#### 1. ENSIROSTRIS MELLERI. (Pl. XXXII. fig. 1.) B.M.

Stuffed, grey-brown, with whitish cross-bands on the body.

*Hab.* E. Africa, on the mountains in the interior (*Dr. Meller*). A single specimen, probably a male.

The head and hood are somewhat like those of *Calumma cucullata*; but the back-crest and the scales are very different, too different to be sexes of the same species, as I was once inclined to think they might be.

### 12. SAUROCERAS.

Nose (of male, at least) with a single central elongated bony horn, with a deep angular channel on the upper, and a sharp edge on the lower side. Orbit rounded. Back rather compressed, with a series of compressed conical scales. Tail compressed above. Occiput keeled, acutely produced behind, shelving on the sides, with a raised edge below, covered with small scales behind. Scales unequal, granular, with large interspersed tubercles.

#### 1. SAUROCERAS RHINOCERATUM. (Pl. XXXII. fig. 2.) B.M.

*Chameleo rhinocerus*, Gray, Cat. B. M. 267.

*Hab.* Madagascar. A single small specimen.

### 13. DICRANOSAURA.

Nose of male produced on the sides into two compressed bony horns covered with scales; of female, simple, hornless. Orbit rounded. Occiput flat above, produced, broad, and rounded behind, with small scales on its hinder sides. Back compressed, keeled, sometimes dentated in front. Chin and belly not toothed. Scales equal.

#### 1. DICRANOSAURA BIFURCA. B.M.

*Chameleo bifurcus*, Gray, Cat. B. M. 268; A. Dum. Arch. du Mus. vi. t. 22. f. 3.

*Chameleon brongniartii*, Fitz. Syst. Rept. 42.

Nose-horns elongate; back dentated in front. Grey (in spirits),





3



4



1



2



with a broad white streak down each side of the belly ; scales equal, square.

*Hab.* Madagascar. Male and female.

Var. *crassicornis*.

B.M.

One of the males, with the horns only partly developed, has them very thick and trigonal at the base, so as nearly to reach across the nose. In another young male, about the same size, they are compressed and far apart at the base, as in the type specimens.

2. DICRANOSAURA PARSONII.

B.M.

*Chameleo parsonii*, Gray, Cat. B. M. 264 ; A. Dum. Arch. du Mus. vi. t. 22. f. 12.

*Chamæleon parsonii*, Fitz. Syst. Rept. 42.

The nose-horns erect, lobed ; back rounded, not dentated in front.

*Hab.* Madagascar.

There is only a female of this species in the Museum.

14. CYNEOSAURA.

Nose of both sexes flat in front, with the sides dilated, serrated, and covered with large scales. The occiput flat, with a sharp-edged, narrow, central keel above, produced, broad, and rounded behind. Orbit simple. Back compressed, with a series of large compressed scales. Chin and belly dentated. Scales unequal.

1. CYNEOSAURA PARDALIS.

B.M.

*Chameleo pardalis*, Gray, Cat. B. M. 266 ; A. Dum. Arch. du Mus. vi. t. 22. f. 11 (head).

*Bradypodium pardalis*, Fitz. Syst. Rept. 43.

Brown in spirits, with a broad white streak down the middle of the sides.

*Hab.* Bourbon ; Madagascar.

7. DESCRIPTIONS OF NEW SPECIES OF BATRACHIANS FROM WEST AFRICA. BY A. GÜNTHER, M.A., M.D., Ph.D., F.Z.S.

(Plate XXXIII.)

PYXICEPHALUS RUGOSUS. (Pl. XXXIII. fig. 1.)

Similar to *P. delalandii*. Habit rather stout ; head broad, the distance between the angles of the mouth being equal to the length of the head ; snout obtuse, as long as the diameter of the eye, with the upper part somewhat projecting beyond the mouth, and with the loreal region obliquely sloping outwards. Lower jaw without prominent apophyses ; eustachian openings narrower than the choanæ ; vomerine teeth in two short oblique series between the choanæ. Tympanum indistinct, smaller than the orbit. Upper parts of the head and body with prominent glandular folds and tubercles ; tubercles in the interorbital region disposed in pairs ; *two glandular folds*

commence behind each superciliary, and converge towards those of the other side, curving again outwards behind the nape. Limbs of moderate length: the second finger is shorter than the first, and the fourth shorter than the second, the third being the longest. The distance between the vent and heel is scarcely less than the length of the body; tarsus with a longitudinal fold; metatarsal tubercle compressed, well developed; toes webbed at the base only; the third a little longer than the fifth. Lower parts of the body smooth.

The upper parts of the head and body are variegated with reddish olive and dark brown, all the dark-brown markings having narrow whitish edges. Two dark-brown bands, the posterior of which is subtriangular, cross the interorbital region. A large subquadrangular space between the inner nuchal folds is reddish olive, with some darker markings; the band-like space between the nuchal folds of each side is dark brown; the foremost part of the snout, a spot below the orbit, tympanum, numerous irregular spots on the hinder part of the body, and, finally, cross bands on the fore and hind limbs are dark brown. Lower parts uniform white.

	lines.
Length of the body . . . . .	18 $\frac{1}{2}$
Width between the angles of the mouth . . . . .	7 $\frac{2}{3}$
Diameter of the eye . . . . .	2
Length of fore limb . . . . .	13
——— of third toe (from base at metacarpus) . . . . .	4 $\frac{1}{2}$
——— of hind limb . . . . .	29 $\frac{1}{2}$
Distance between vent and heel . . . . .	17
Length of fourth toe (from the base at metatarsus)	9

Two specimens of this species were collected by Dr. Welwitsch at Pungo Andongo (Angola).\*

#### PHRYNOBATRACHUS NATALENSIS.

This species occurs also on the west coast; however, specimens from Angola have the toes a little more slender than those from Natal.

Snout rather pointed, somewhat longer than the diameter of the eye (without canthus rostralis), the loreal region obliquely sloping outwards. No fold in front or behind the orbit. Choanæ and eustachian openings very small; tongue narrow, deeply notched behind. Tympanum indistinct, small. Upper parts with flat, smooth tuber-

\* The celebrated traveller and botanist, Dr. Welwitsch, has presented to the British Museum a very interesting collection of reptiles from the different provinces of Angola which he visited:—*Crocodilus vulgaris*, from Pungo Andongo; *Monitor niloticus*, from Condo; *Scelotes bipes*, L., *Agama occipitalis*, Gray, *Chamaleo senegalensis*, from Condo; *Chamaleo tuberculiferus*, Gray, from Mossamedes; *Dasyplettis palmarum*, Leach, *Psammophis oxyrhynchus*, Reinhardt, from Pungo Andongo; *Ahetulla irregularis*, Leach, *Boodon lineatus*, Gthr., *Causus rhombeatus*, Wazl., *Dendraspis welwitschii*, Gthr., *Atractaspis irregularis*, Reinh. (this specimen has the five anterior subcaudal shields entire, and the other seventeen divided! it is from Pungo Andongo); *Clotho arietans*, Merr., and *Vipera caudalis*, Smith, from Mossamedes; *Dactylethra levis* and *Hyperolius marmoratus*, Rapp, from Huilla, from 5000 to 6000 feet above the level of the sea; *Rana oxyrhyncha*, Sundev.; *Bufo pantherinus*, Boie.

cles; lower parts smooth, except the very expansible skin of the throat in the male, which is folded. Limbs of moderate length; the first finger is scarcely longer than the second and fourth, which are equal in length, the third being the longest. The distance between vent and metatarsal tubercles is only a little more than the length of the body; metatarsus with two tubercles, tarsus with a third on the middle of its inner edge. Toes tapering, half-webbed, the third being a little longer than the fifth; the fourth very slender. Dark-brownish olive, with indistinct darker spots on the sides; lower parts white; throat of the male brown, of the female dotted with brown

	lines.
Length of the body . . . . .	15
— of the fore leg . . . . .	9
— of the hind leg . . . . .	23
Distance between vent and heel . . . . .	$12\frac{1}{2}$
Length of tarsus, with fourth toe . . . . .	$10\frac{1}{2}$
— of fourth toe, without tarsus . . . . .	7

The British Museum has received several examples of this species from M. Barboza du Bocage; they were collected in the province Duque de Braganca.

*Phrynobatrachus natalensis*, Günth. Proc. Zool. Soc. 1862, p. 190, is identical with *Stenorhynchus natalensis*, Smith—a frog which I omitted to compare when describing *Phrynobatrachus*. *Dicroglossus angustirostris*, Cope, Proc. Acad. Nat. Sc. Philad. 1862, p. 341, is likewise identical with that species. Peters proposed the generic name of *Leptoparius* for that of *Stenorhynchus*, because the latter is preoccupied (Monatsber. Akad. Wiss. Berl. 1863, p. 452); *Phrynobatrachus*, however, has the priority.

#### CYSTIGNATHUS BOCAGII. (Pl. XXXIII. fig. 2.)

Similar in habit to *C. senegalensis*. Head broad and short, with the snout obtusely rounded; canthus rostralis short; loreal region flat, oblique; eye of moderate size, tympanum rather indistinct, much smaller than the eye. Vomerine teeth in two short groups, between the choanæ, which are small; tongue broad behind, truncated, with each hinder corner slightly produced; fore limbs of moderate length; hind limbs and toes short; a rather large, compressed, ovate tubercle at the base of the inner toe. Upper parts smooth; all the lower parts, from the chin to the vent, coarsely granulated; skin between the angle of the mouth and the eye granular. Upper parts and throat brownish black, the remainder whitish.

	lines.
Length of body . . . . .	20
Width between the angles of the mouth . . . . .	8
Length of fore limb . . . . .	12
— of third and fourth toes . . . . .	$3\frac{1}{3}$
— of hind limb . . . . .	26
— of fourth toe (from the tarsus) . . . . .	8
— of fifth toe . . . . .	$6\frac{1}{4}$
Distance between vent and heel . . . . .	$14\frac{1}{2}$

For the knowledge of this species I am indebted to M. Barboza du Bocage, who has allowed me to examine the unique specimen brought from the province of Duque de Braganca (Angola) to the Lisbon Museum.

*HYPEROLIUS NASUTUS.* (Pl. XXXIII. fig. 3.)

Snout much produced, acutely pointed, with the canthus rostralis angular, and the loreal region flat; diameter of the eye more than half as long as the snout; tympanum hidden; tongue deeply notched; limbs slender; fingers slightly, toes half webbed. Upper parts smooth; belly faintly granulated. Reddish white, with more or less numerous brown dots on the head and back.

	lines.
Length of body .....	11 $\frac{1}{2}$
——— of hind limb .....	17 $\frac{1}{2}$
Distance between vent and heel .....	11 $\frac{1}{2}$
Length of fore limb.....	8

This species inhabits the province Duque de Braganca, whence we have received it through M. Barboza du Bocage. Other specimens are in the Lisbon Museum.

*HYPEROLIUS RETICULATUS.* (Pl. XXXIII. fig. 4.)

Snout broad, rather depressed, of moderate length, somewhat truncated in front, with the loreal region flat and vertical. Tympanum small, but distinct; tongue heart-shaped, notched behind. Limbs of moderate length; fingers one-third, toes two-thirds webbed. Upper parts smooth; belly finely granulated. All the upper parts densely covered with round white spots, as large as the eye, and separated from one another by the brown ground-colour, which appears as a regular network. Femur entirely colourless.

	lines.
Length of body .....	15
——— of hind limb .....	23
Distance between vent and heel .....	13 $\frac{1}{2}$
Length of fore limb.....	9

A single specimen is in the collection of the British Museum, and comes probably from West Africa.

8. NOTES ON SUNDRY MAMMALIA. BY E. BLYTH.

*The Species of Chevrotain.*

The excellent memoir by M. Alphonse Milne-Edwards on the Chevrotains, or 'Mouse-Deer,' with its accompanying coloured figures, leaves little to be accomplished in the way of further elucidating the specific types of these animals.

The fairly recognizable subordinate types, respectively, of India with Ceylon, and of the Malay countries, *Meminna* and *Tragulus* of

Gray, are united under the latter name by M.-Edwards, who acknowledges five specific forms, as *T. meminna*, *T. javanicus*, *T. napu*, *T. kanchil*, and *T. stanleyanus*.

*T. meminna*, seu *Meminna indica*, Gray, inhabits India with Ceylon exclusively—the *M. malaccensis*, Gray, differing in no respect whatever, and most assuredly being as foreign to the Malayan peninsula as *T. stanleyanus* is to Ceylon, even though a specimen of the latter may have chanced to find its way to England *via* Ceylon. Long-experienced observers in that island, as Mr. E. L. Layard and the late Dr. Kelaart, Dr. Templeton, Mr. Brodie, Sir J. Emerson Tennent, and others, are not likely to have overlooked so conspicuous a little animal as a second species of Chevrotain, did it really exist as an inhabitant of Ceylon. Both in its more bulky form and in its markings, the *Meminna* singularly resembles the *Hyomoschus aquaticus* of West Africa.

The name *javanicus* is rightly assigned by M.-Edwards to a small and very distinct species, which I described by the name *T. pelandoc* in the Journ. As. Soc. B. xxvii. 277, remarking that “this species accords better than any other with Buffon’s figure of *le Chevrotain de Java*.” I have reason to doubt, however, that it inhabits the Malayan peninsula, the *T. javanicus* of the late Dr. Cantor’s catalogue of the Mammalia of that peninsula (J. A. S. B. xv. 262) being the comparatively large *T. napu*, F. Cuvier and A. M.-Edwards, which has been undistinguished as a separate species by Dr. Gray.

The common Chevrotain of the Malayan peninsula is *T. kanchil*, the range of which extends to the southern Tenasserim provinces as high as Yé, beyond which no species of the group has been observed northward in the provinces east of the Bay of Bengal. The *T. affinis*, Gray, was originally founded on a specimen of *T. kanchil*, believed to be from Malacca, which wants the ordinary *medial* line on the chest; but those sent by the late M. Mouhot from Cambodia, and likewise referred by Dr. Gray to his *T. affinis*, would seem to be of a race in which that medial line is normally absent, and which is also more uniformly coloured than the others, being not so dark, with the posterior nuchal streak little more than indicated, and the lines in front of the neck are not nigrescent, but of the same hue as the back.

The *T. napu* also inhabits the Malayan peninsula, but is there much rarer than the *T. kanchil*, and the two bear the native names adopted as their specific appellations; but it appears from Dr. Cantor that the *T. kanchil* is denominated *Pelandoc* by some Malays, while elsewhere it is not unlikely that the *T. javanicus* may be specially so designated, by people who know it as a different species from the *T. kanchil*. In Calcutta, the *T. kanchil* is the only kind which is at all commonly to be procured of the dealers in animals, and I have never seen *T. javanicus* in their possession, and *Tragulus meminna* but rarely.

*T. stanleyanus* is given by M.-Edwards from the Sunda Islands. I have seen numerous examples of this race, and among them some which were so far intermediate in colouring as to lead to a suspicion that it is no other than a local race or variety of *T. napu*, though, in general, the markings of the neck are broader and less abruptly

defined. In the Calcutta Museum there is also a pair different from any noticed by M.-Edwards, that probably indicate a third local race of *T. napu*. They are remarkable (more especially the female) for the blackish hue of the whole neck, and of the two dark streaks alternating with three white ones in front of it. General colour rufous (as in *T. stanleyanus*), the black tips to the hairs showing much; the breast and towards the hind legs white, separated by fulvous, which occupies the medial region of the belly, extending quite across it. From hock to point of succentorial hoof, 4 inches. Their habitat is unknown.

The Malayan Chevrotains divide themselves primarily into large and small. Of the large, there is the *T. napu*, with two kindred races, the rufous *T. stanleyanus* and the black-necked rufous race. Of the small, the *T. javanicus* and the *T. kanchil* are a degree better distinguished, and would be generally recognized as species; while the Cambodian *T. affinis* differs only slightly in colouring from the *T. kanchil*, though perhaps constantly wanting the medial dark line on the chest.

#### *The Asiatic Civets.*

Besides the common *Viverra zibetha*, L. (or *Zibet* of Buffon), inhabiting Bengal, Nipal, Assam, &c., and the small *V. tanggalunga*, Gray, inhabiting the southern half of the Malayan peninsula, Java, and the Philippines, there are two large races of Asiatic Civet which need recognition. One of them inhabits Southern Malabar and probably Ceylon, and is only distinguishable from the ordinary African *V. civetta* by its dorsal mane commencing from between the shoulders, instead of (Hyæna-like) between the ears. The other is the *V. tanggalunga* apud Cantor, but not of Gray, from the northern half of the Malayan peninsula, and also the *V. megaspila*, nobis (Journ. As. Soc. B. xxxi. 345), from Upper Pegu; and the *V. zibetha* apud Waterhouse (Cat. Zool. Soc. Mus. 1838, no. 252), from Sumatra, I believe, from recollection of the specimen, to be no other; but the *V. zibetha* of Cantor, from Province Wellesley, is identical with the Bengal race. There is an African Civet now living in the Society's Garden which greatly resembles in its markings the *megaspila* race of Pegu &c. As compared with that of Travancore or S. Malabar, the body-spots are fewer and much larger, and entire for the most part, or showing little tendency to group into ocelli; and on the sides they tend less to form into vertical bands or stripes. *V. zibetha* of Bengal, *V. civettina* of S. Malabar, and *V. megaspila* of Pegu &c., are of the same large size as *V. civetta* of Africa, and it is probable that their skeletons would not be distinguishable; but *V. tanggalunga* of the Malay countries is a much smaller species, and is much more minutely spotted than the others. All are represented in the Derby Museum of Liverpool, the *V. megaspila* by an adult from the late Dr. Cantor's collection, while an immature specimen of the same, also from Dr. Cantor's collection, is now in the "India Museum" at Fyfe House. The small *Viverricula malaccensis* (seu *indica*, *rasse*, *pallida*, &c.) is generally diffused over

India with Ceylon, the Indo-Chinese and Malayan countries, and probably S. China.

*Martes flavigula* (Boddaërt).—There are different races of this animal which require to be noted. That common in the Himalaya, extending to the mountain-range which separates Arakan from Pegu, and probably also that of the Amûr region, has the face, cheeks, and nape blackish brown, abruptly demarcated; chin and throat white; breast and fore part of the body pale yellowish brown, mostly darker along the middle of the back, and passing to blackish brown upon the croup, fore limbs, hind quarters, and tail. Of this type of colouring I have seen very numerous examples; but others from the Nilgiris, in Southern India, have the entire upper parts uniform blackish brown, with the white throat and yellowish breast of the preceding, and not further differing. The latter I formerly supposed to be *M. Gwatkinsii*; C. H. Smith (in Jardine's Nat. Libr.), although this is stated to be from the N. W. Himalaya; and it appears that the name truly applies to the Himalayan race in summer vesture, as shown by Mr. A. Leith Adams (Proc. Zool. Soc. 1858, p. 516). In this case, the detached Nilgiri race may yet have a peculiar winter pelage; and such, I suspect, is illustrated by a specimen from some part of S. India, which Mr. W. Elliot sent for my inspection some years ago, and of which the following is a description:—Upper parts nearly uniform brown, paler on the sides; chin, throat, and breast as usual; the lower parts dark, with some irregular blackish spots between the fore limbs; a peripheral blackish mark behind the ear (indicative of the margin of the black cap of the Himalayan race), continued less distinctly forward; the brown of the crown and nape less dark than in Himalayan specimens, and continued uniformly on the shoulders and croup, scarcely paling along the middle of the back; tail much browner than in the others, and the limbs scarcely so dark. Perhaps, however, the latter may be a peculiar race, and that of the Nilgiris may have the entire upper parts permanently black. Lastly, a very distinguishable race (original *M. flavigula*, Bodd.?) inhabits the Malayan peninsula, of which I have seen numerous examples. It resembles the Himalayan race, but the fur is constantly much shorter, and the tail consequently is less bushy; the blackish cap is merely indicated by pale brown, but with a peripheral dark line passing from behind each ear. All that I have seen were quite similar.

#### *The Unicorn Goat of Tibet.*

Some years ago Mr. Robert Schlagintweit called the attention of the zoological section of the British Association to the united horns of what he termed the "Unicorn Sheep" of Tibet, mentioning that the horns were separate in the young animal, each growing, as usual, from the centre of ossification of the frontal bone; but, turning towards each other, they met and were finally enveloped in the same cortical or cuticular integument, like two fingers of the hand inserted into one finger of a glove. A skull bearing such horns, but with the

tips sawn off, presented by B. H. Hodgson, Esq., to the "India Museum" now at Fyfe House, appears to me to be that of a Goat, and not of a Sheep. A similar skull, with the horns conjoined for the same distance, but with divergent tips, is in the British Museum; and there is a frontlet, with horns quite similar to the last, in that of the Royal Society of Dublin. In the Zoological Gardens, Regent's Park, there is now living a long-haired Sikhim or Tibetan Goat, in which the horns are parallel and nearly approximate, but without meeting; and I have little or no doubt that it is of the same race of domestic Goat which occasionally bears the so-called "Unicorn" appendage.

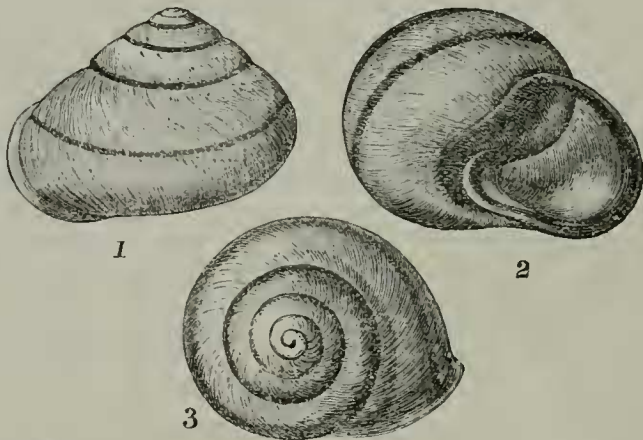
9. DESCRIPTIONS OF TWO NEW SPECIES OF AUSTRALIAN LAND SHELLS. BY JAMES C. COX, M.D., F.R.C.S. EDINBURGH.

SUCCINEA EUCALYPTI\*.

*S. testa globoso-conica, ventricoso-inflata, anfractibus tribus subintense brunnea, rugosa, minute striata, apice rosea; apertura ovato-rotundata.*

Diam. maj.  $4\frac{1}{2}$ , min. 4 mill.

This shell, a specimen of which I send, I have named *eucalypti*, from the fact of its being *always found* under the bark of the *Eucalyptus*-trees, about 4 feet from the ground, on high dry hills near the Blue Mountains. When fresh, the rose-coloured apex is very well marked.



HELIX MACLEAYI.

*H. testa imperforata, globoso-depressa, solidiuscula; epidermide cinereo-fusca, minute striata, apice violacea; fascia nigra cingulata; spira obtusa; sutura impressa, alba; anfractibus sex, convexiusculis; apertura lunato-subcirculari, marginibus expansis, undique intense purpureo-violacea.*

*Hab.* Port Denison, Queensland.

\* The type specimens of this species have been deposited in the British Museum.







$\frac{1}{4}$ .

J. Wolf del. et lith

M. & N. Hanhart. imp

ANAS MELLERI.

10. DESCRIPTION OF A NEW SPECIES OF DUCK FROM MADAGASCAR. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plate XXXIV.)

In the 'Proceedings' of this Society for 1863 (p. 160) I have given a list of the Mammals and Birds collected by Dr. C. Meller during his journey up to Antananarivo. I there included a species of Duck, of which two examples were obtained in the marshes near Analamazotra, under the name *Dafila erythrorhyncha* (Gm.). My attention having been again called to this bird through meeting with fresh specimens in the collection of the Royal Institution at Woolwich, lately obtained in Madagascar by Mr. J. Caldwell, I have been induced to reexamine it. On comparing it with the fine series of Anatidæ in the British Museum, I find it is certainly not *Dafila erythrorhyncha*; indeed it is very little like that species. As it is moreover not in the British Museum, and cannot be associated with any other species mentioned by Hartlaub in his work on the 'Birds of Madagascar,' I believe I am justified in considering it as probably new to science. I propose therefore to call it, after its discoverer,

*ANAS MELLERI*, sp. nov. (Pl. XXXIV.)

*Supra nigra, plumis omnibus brunneo late marginatis; subtus brunnea, plumarum omnium macula mediali nigra; capite et cervice brunneis, nigro striolatis; pileo obscuriore et crebrius striolato: alis fusco-nigris, tectricum marginibus brunnescens; speculo alari æneo-viridi, supra et subtus nigro marginato; secundariorum apicibus et tectricibus subalaribus albis: caudæ rectricibus et tectricibus superioribus dorso concoloribus: rostro nigro: pedibus carnis.*

Long. tota 22·0, alæ 9·25, caudæ 3·5, rostri a rictu 2·6, tarsi 1·75.

*Hab.* In Madagascar.

This Duck seems to belong to the group of true *Anas*, represented by *A. superciliosa* of Australia, *A. obscura* of North America, and others, in which the sexes are alike. There is no trace of a supercilious mark, and the species is not very much like any other that I am acquainted with. Dr. Meller's two specimens were, as I have already stated, obtained in the marshes near Analamazotra. The native name is said to be *Harki*. The iris is marked "sienna-brown." Mr. J. Caldwell's example was procured at Antananarivo, in September 1862, and is marked "*female*." Mr. A. Newton has likewise a specimen of the same Duck, obtained by Dr. Roch at Tamatave\*.

I may take this opportunity of mentioning that the collection of the Royal Institution at Woolwich also contains an example of *Turtur semitorquatus*, Sw., from Madagascar. This bird I have already

\* See Ibis, 1863, p. 174, where this bird is wrongly called *Anas xanthorhyncha*.

recorded as being met with in the Comoro Islands (see Ibis, 1864, p. 300); so that its existence in Madagascar also might have been anticipated.

11. REPORT ON A COLLECTION OF REPTILES AND FISHES FROM PALESTINE. BY A. GÜNTHER, M.A., M.D., Ph.D., F.Z.S.

The natural history of Palestine has been very incompletely known, and there are only a very few collections in which specimens illustrating its reptiles and fishes are exhibited. Hasselquist was the first who described a fish from the Lake of Galilee; and several others from the Jordan are mentioned in Cuvier and Valenciennes's 'Histoire Naturelle des Poissons.' Of reptiles only a few species of Snakes were mentioned by M. Jan in a pamphlet entitled 'Elenco sistematico degli Ofidi.'

The British Museum received first a few species from a collection made by Th. W. Beddome, Esq., who visited Palestine in 1862, and fell a victim to a malignant fever during his return. The species collected by him will be mentioned below. A magnificent collection has been formed by the Rev. H. B. Tristram; indeed we believe that it is the most ample ever brought to Europe, and that it fully illustrates the character of the fauna. Comparatively few of the species are new and apparently peculiar to Palestine, nearly all the reptiles being identical with, or closely allied to, species belonging to the Mediterranean fauna proper. Only one species (*Daboia xanthina*) reminds us of the Indian fauna. The most interesting form is the new genus of Snakes described below, the affinities of which are rather obscure.

The ichthyological part of Mr. Tristram's collection shows the affinity of the Jordan with the Nile and other rivers of tropical Africa, *Chromis* and *Hemichromis* being truly African forms, whilst nearly all the other species are identical with, or very closely allied to, fishes from the fresh waters of Syria.

*List of the Species.*

Those marked with an asterisk (\*) are new.

TORTOISES.

*Testudo græca*, L. Everywhere.  
*Emys caspica*, Gm.

SAURIANS.

*Lacerta viridis*, L. Jerusalem, Merom, Mount Hermon.  
*L. lævis*, Gray. Jerusalem, Dead Sea.  
*Zootoca muralis*, Laur. Syria, Beyrout.  
*Z. deserti*, Gthr. Lebanon.  
\**Z. tristrami*, Gthr. Lebanon.  
*Mesalina pardalis*, Licht. Beersheba.  
*Pseudopus pallasii*, Oppel. Mount Hermon.  
*Ophiomorus miliaris*, Pall. Mount Hermon.  
*Ophiops elegans*, Ménétr. Galilee, Mount Hermon.

- \**Seps monodactylus*, Gthr. Galilee, Merom, Mount Hermon.  
*Plestiodon auratus*, Schn. Dead Sea.  
*Euprepes fellowsii*, Gray. Jerusalem, Merom, Mount Hermon,  
Galilee, Beersheba.  
*Gongylus ocellatus*, Forsk. Jerusalem, Dead Sea, Gilead.  
*Ptyodactylus gecko*, Hasselq. Jerusalem, Mount Hermon, Dead  
Sea.  
*Stenodactylus guttatus*, Cuv.  
*Gymnodactylus geckoïdes*, Spix. Mount Carmel.  
*Stellio cordylina*, Laur. Galilee.  
*Trapelus sinaita*, Heyden. Dead Sea.  
*Chamæleon vulgaris*, Daud. Merom, Galilee, Dead Sea.

## OPHIDIANS.

- \**Rhynchocalamus melanocephalus*, Gthr. Merom.  
*Ablabes coronella*, Schl.† Lebanon, Merom, Galilee.  
*Ablabes modestus*‡, Martin. Galilee, Lebanon, Mount Hermon.  
*Ablabes decemlineatus*, D. & B. Galilee, Lebanon, Merom. This  
species differs constantly from *A. modestus* in having the posterior  
and anterior chin-shields of equal length, whilst in *A. modestus* the  
anterior are much longer than the posterior. Moreover it has never  
the black markings on the head and neck.  
*Zamenis dahlî*, Schleg. Mount Tabor.  
*Z. ventrimaculatus*, Gray. Dead Sea.  
*Z. caudolineatus*§, Gthr. Jerusalem, Hiram's Tomb, Nazareth.  
*Z. atrovirens*, Shaw. Galilee, Merom.  
Var. *carbonaria*||. Galilee, Merom.  
*Tropidonotus hydrus*, Pall. Jerusalem, Galilee, Merom, Lake  
Phiala.  
*Tachymenis vivax*, Fitz. Jerusalem, Mount Tabor.  
*Cælopeltis lacertina*, Wagl. Jerusalem, Galilee.  
*Eryx jaculus*, Hasselq. Galilee.  
*Daboia xanthina*¶, Gray. Galilee.  
*Vipera euphratica*, Martin. Galilee.  
*V. ammodytes*, L. Syria, Lebanon.  
*Echis arenicola*, Boie. Dead Sea.

## BATRACHIANS.

- Rana esculenta*, L. Dead Sea\*\*, Galilee, Merom, plains of Phœ-  
nicia.  
*Bufo pantherinus*, Boie. Dead Sea\*\*, Mount Carmel.  
*Hyla arborea*, L. Dead Sea, Jerusalem, Wady-el-Kurn.

† *Calamaria coronella*, Schleg. This is not a true *Calamaria*, having two pairs  
of frontal shields. The loreal shield is small, sometimes absent; specimens with-  
out loreal have been called *Homalosoma coronelloides*, Jan.

‡ *Eirenis rothii*, Jan, is not specifically distinct.

§ All the specimens from Palestine have the scales in 25 series.

|| Some of the specimens are entirely black, and have the eye a little smaller.

¶ *Vipera confluenta*, Cope, is very closely allied to it.

\*\* Among the numerous specimens of *Rana esculenta* and *Bufo pantherinus* col-

## FISHES.

*Blennius lupulus*, Bonap. This species was first discovered by Mr. Th. W. Beddome in the Lake of Galilee, and has been found again by Mr. Tristram in the Nahr el Kelb. Unfortunately I have no opportunity of comparing our specimens with examples from Italy; but they agree perfectly with the description and figure given by Bonaparte.

*Chromis nilotica*, Hasselq. Lake of Galilee, Dead Sea. All the specimens have  $D. \frac{16}{12-13}$ ;  $A. \frac{3}{10}$ . Although Hasselquist himself distinguishes a *Sparus galilæus*, attributing to it seventeen dorsal spines, it is not improbable that he took his notes from the same species which I consider as identical with the *Chromis* of the Nile. Hasselquist evidently drew up the description of the Galilean fish in a hurried manner, and never had an opportunity of comparing it with a specimen from the Nile. It even seems as if he never thought of the affinity of these fishes, referring one to *Sparus*, the other to *Labrus*. It would be also very singular that Mr. Tristram, although collecting these fishes in great number, should not have found the only species known to Hasselquist. Yet it is not very improbable that the species seen by Hasselquist is a fourth form of this family, inhabiting the Lake of Galilee. This species and the *Hemichromis* mentioned hereafter are the most common in the Lake.

\* *Chromis simonis*, Gthr. Lake of Galilee.

\* *C. andreae*, Gthr. Lake of Galilee.

\* *Hemichromis sacra*, Gthr. Lake of Galilee.

*Clarias macracanthus*, Gthr. Lake of Galilee.

*Cyprinodon mento*, Heckel. Ramoth-Gilead.

*C. cypris*, Heckel. Jordan.

*C. sophiae*, Heckel. Dead Sea, near the entrance of rivulets.

*Barbus longiceps*, Cuv. & Val. Lake of Galilee.

*Labeobarbus canis*†, Cuv. & Val. Lake of Galilee.

*Scaphiodon capoëta*†, Güldenst. Lake of Galilee, Jordan, streamlets by the Dead Sea, Nahr el Kelb, Wady el Kurn.

*Acanthobrama*, sp.?, young. This species has been found by Mr. Beddome; but no example is in Mr. Tristram's collection.

*Discognathus rufus*, Heckel. Ramoth-Gilead.

*Cobitis insignis*, Heckel. Dead Sea, close to the entrance of rivulets.

\* *C. galilæa*, Gthr. Lake of Galilee.

? *Anguilla microptera*, Kaup. Three half-grown specimens from Nahr el Kelb best agree with the Eel called *A. microptera* by Kaup; but it appears to me very doubtful whether the numerous species distinguished by that gentleman will stand the test of a critical re-

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lected on the shores of the Dead Sea, there is one example of both these species which is provided with numerous tubercles. These tubercles are minute in the Frog, spine-like and very large and prominent in the Toad. Other specimens collected at the same localities are smooth, or provided with flat tubercles only.

† Specimens of these species have also been collected by Mr. T. W. Beddome.

sion; and it is not improbable that the Eel of the Jordan will prove to be of the same species as that of the Nile.

*Descriptions of the New Species.*

ZOOTOCA TRISTRAMI.

Dorsal scales distinctly imbricate, smooth, those along the vertebral line half as large as the loreal shield; ventral shields in nine longitudinal and in twenty-eight transverse series. Collar rather indistinct, and not continued across the middle of the chest. Gular scales between the chin-fold and the collar large; those between the chin-fold and the chin very small. Temple with granular scales; an oblong shield along the outer margin of the occipital. Vertical cuneiform, tapering behind. Upper parts brownish red, with irregular black and white markings, arranged in cross bands on the sides, and not continued across the vertebral line.

Length of body  $2\frac{1}{2}$  inches.

Lebanon.

SEPS MONODACTYLUS.

Limbs extremely small, not divided into toes: the anterior scarcely half as long as the snout; the posterior as long as a scale. The middle of the trunk surrounded by twenty scales. Uniform olive-green above, whitish below. Otherwise similar to *S. tridactylus*.

Galilee, Merom, Mount Hermon.

RHYNCHOCALAMUS (g. n. *Calamaridarum*).

Body rather elongate, cylindrical; head small, not distinct from neck; tail of moderate length. Rostral shield enlarged, without longitudinal keel, far produced backwards between the anterior frontals; two pairs of frontal shields; one nasal. Scales smooth, in fifteen rows; subcaudals in two rows. Maxillary teeth few in number, comparatively strong, subequal in size; the posterior broad at the base, with an impression, but without longitudinal groove; palatine teeth none.

RHYNCHOCALAMUS MELANOCEPHALUS.

Head small, depressed, triangular, the snout being somewhat pointed. Eye small, with round pupil. Frontal shields of moderate size, the posterior not twice as large as the anterior; vertical six-sided, with a very obtuse angle in front, and with a pointed one behind, rather longer than broad; occipitals not much longer than vertical, rounded behind. Nasal oblong; loreal squarish, one anterior and one post-ocular. Six upper labials, the third and fourth entering the orbit, and the sixth being the largest. Temporals 1+1. There are two pairs of chin-shields; but the posterior are small, almost scale-like, only half the size of the anterior, and separated from each other by a scale; there are three pairs of lower labials, in contact with the anterior chin-shields. Scales with a single minute apical groove. Ventrals 218; anal bifid; subcaudals 54. Upper

parts reddish olive, lower ones white; upper surface of the head, rostral shield, and nape of the neck black; upper lip white, a white line running across the rostral shield.

Length of head  $\frac{1}{3}$  inch, of trunk 14 inches, of tail 3 inches.

Merom.

#### CHROMIS SIMONIS.

D.  $\frac{15}{10}$ . A.  $\frac{3}{9}$ . L. lat. 31.

The height of the body is contained twice and a half in the total length (without caudal); the length of the head twice and three-quarters. Snout rather obtuse, *with the lower jaw slightly projecting beyond the upper*; the maxillary extends to below the middle of the præorbital, which is as wide as the orbit. Teeth small: there are about thirty-seven on each side, of the outer series, in the upper jaw. The eye is situated nearer to the end of the snout than to that of the operculum; there are three series of scales on the cheek, and the naked portion of the præoperculum is much narrower than the orbit.

The dorsal fin commences before the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the length of the last being two-fifths of that of the head; the soft dorsal extends to, or somewhat beyond, the base of the caudal; the third anal spine as long as the thirteenth of the dorsal fin. Caudal fin slightly rounded. Pectoral fin extending somewhat beyond the origin of the anal; ventral not reaching the vent.

There are three and a half longitudinal series of scales between the origin of the dorsal fin and the lateral line; extremity of the operculum scaleless; scales on the belly very small. Coloration uniform.

Only two specimens were procured from the Lake of Galilee; they are 7 inches long.

#### CHROMIS ANDREÆ.

D.  $\frac{15}{12}$ . A.  $\frac{3}{10}$ . Lin. lat. 31.

The height of the body is contained twice and a half or twice and two-thirds in the total length (without caudal); the length of the head rather more than thrice. Head not much longer than high; snout rather obtuse, with the jaws equal in length anteriorly, or with the upper slightly projecting beyond the lower. Teeth small, there being from twenty to twenty-three on each side, of the outer series, in the upper jaw; maxillary extending to below the middle of the præorbital, which is as wide as the orbit. Eye situated in the middle of the length of the head; there are three series of scales on the cheek, and the naked limb of the præoperculum is much narrower than the orbit; extremity of the operculum naked.

The dorsal fin commences vertically above the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the last being half as long as the head. The soft dorsal is produced into a point, which extends nearly to the middle of the caudal fin. Anal spines stout, the third being as long as, but



much stronger than, the twelfth of the dorsal fin. Caudal fin truncated, scaleless, not much shorter than the head. The pectoral does not quite extend to the origin of the anal; the ventral reaches the vent.

There are three and a half longitudinal series of scales between the origin of the dorsal fin and the lateral line. Scales in the thoracic region very small, much smaller than those on the belly. Body uniformly coloured; extremity of the operculum black; dorsal and caudal fins with numerous round whitish spots.

Three specimens were collected in the Lake of Galilee. The larger is  $7\frac{1}{2}$  inches long; the two others 5 in.

#### HEMICHROMIS SACRA.

D.  $\frac{14}{11}$ . A.  $\frac{3}{8}$ . L. lat. 31.

The height of the body is contained twice and three-fourths in the total length (without caudal); the length of the head twice and a third. Head much longer than high, the snout being compressed and much produced; its extent is two-fifths of the length of the head; lower jaw very prominent; the maxillary extending to below the middle of the præorbital, which is much wider than the orbit. Teeth pectiniform, in a band; those of the outer series are somewhat larger than the others; but there are no anterior canine teeth. The eye occupies the middle of the length of the head, and is situated immediately below the upper profile. Scales on the cheek in four series; the naked portion of the præoperculum as wide as the orbit. The dorsal fin commences somewhat in front of the root of the pectoral; its spines are of moderate strength, gradually increasing in length behind, the length of the last being two-sevenths of that of the head; the soft portion extends to the root of the caudal when laid backwards; the third anal spine is the longest, as long as the twelfth of the dorsal fin. Caudal fin slightly rounded, more than half as long as the head, not scaly. The pectoral extends somewhat beyond the origin of the anal; ventral not reaching to the vent. Scales not serrated: there are four longitudinal series between the origin of the dorsal and the lateral line; those on the belly are very small. Extremity of the operculum naked. Greenish olive above, silvery on the sides and below; fins greyish; extremity of the operculum pearl-coloured; sometimes an oblong blackish spot on the middle of the side of the body.

This is a common species in the Lake of Galilee and in the Jordan. The specimens collected are from 7 to 9 inches long.

#### COBITIS GALILÆA.

D. 2/9. A. 2/6. Scaleless; caudal fin truncated. The length of the head is one-sixth of the total. The origin of the dorsal fin is somewhat nearer to the extremity of the snout than to the root of the caudal.

This species was discovered by Th. W. Beddome, Esq., who brought one specimen from the Lake of Galilee.

## 12. NOTES ON THE ZOOLOGY OF SPITSBERGEN. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

In the month of May last, Mr. Edward Birkbeck offered me a berth in his yacht, the 'Sultana,' R. T. Y. C., on a voyage to Spitsbergen. As this was a country I had long been desirous to visit, I was very glad of the opportunity of seeing it, which had so unexpectedly presented itself. On the 31st of May I found myself on board the vessel at Lowestoft, and the following morning we sailed northward. After a passage protracted by some tedious calms, we cast anchor in the Bay of Hammerfest on the evening of the 26th June. Here it was necessary to stay for some days, while a Norwegian "*jægt*" was being equipped to accompany us, and to take us, if necessary, into the ice, where the yacht, from her extreme length, would become embarrassed, and from her slight build dangerous. Late in the evening of the 2nd July the necessary preparations were completed, and the 'Semmline,' a sloop of some thirty or forty tons, got under way. The next morning the 'Sultana' followed, and, overhauling her consort in the narrow seas, in the course of the afternoon lost sight both of her and the land of Norway. On the afternoon of the 6th July we made the South Cape of Spitsbergen, bearing N.E.

Our first rendezvous having been appointed about halfway up the deep bay marked on English charts as Wibelan's Water, and known to Norsk walrus-hunters as Stor Fjord, which indents the archipelago of islands forming Spitsbergen, our course was altered accordingly; but we were soon brought up, after passing a good deal of drift ice, by the appearance of very closely packed ice, stretching across as far as the state of the atmosphere would allow us to see it. This to our pilot, a man whose knowledge of Spitsbergen is scarcely surpassed by any one, was a manifest indication of the fjord being completely blocked up, and he did not hesitate to order us to proceed to our second rendezvous in Ice Sound, on the west coast. Thither we made sail, trying as we passed northward successively to enter Horn and Bell Sounds, both of which we found to be impracticable from the same cause as had been the Stor Fjord. On nearing Ice Sound, on the afternoon of the 8th July, we found a good deal of ice drifting out of its mouth; but it was of such a kind as to cause no risk to the ship, with our careful captain and pilot. While we were watching with interest the novel scene presented to us by the varied shapes of the frozen masses through which we were navigating, there was a cry of "White Whales!" and a "school" of *Beluga catodon* passed across our bows. Though there were the vivid hues of drifting ice-blocks with which to contrast them, I was agreeably pleased to see that their colour stood this high trial. When, some years ago, I saw the so-called "White Porpoises" of the river St. Lawrence, identified by Dr. Gray (Cat. Brit. Mus. Cetacea, pp. 78, 79) with this species, they had a very tallowy appearance; now the worst that could be said of these beasts is that they looked the colour and consistency of a good spermaceti candle. There were

at least six or eight of them swimming at very short distances from one another, and they glided rapidly through the water with an easy and almost graceful roll, now and then emerging from the surface sufficiently to show the whole of their bodies.

It is not my intention now to say much concerning the birds of Spitsbergen; but I must mention that the sound we were entering presents one of the most wonderful sights to the eye of the ornithologist that can possibly be conceived. The species which frequent Spitsbergen are few in number, much fewer than had been thought prior to the publication of Herr A. J. Malmgren's admirably critical papers\*; but the number of individuals is past all computation. It will be sufficient here to name the species I observed at this time, and this I shall do somewhat in the order of their comparative abundance. First *Mergulus alle*, *Uria arra*, and *Cepphus grylle*; then *Rissa tridactyla*, *Somateria mollissima*, *Procellaria glacialis*, *Fratercula glacialis*, *Larus glaucus*, and, lastly, an *Anser* which I shall specify hereafter. All these, excepting *Larus glaucus*, we found breeding around Ice Sound, indeed, I may say, in the immediate neighbourhood of Safe Haven, a commodious inlet on its northern shore, where the yacht dropped her anchor on the morning of the 9th July.

The whole of the next week was employed by our party in exploring, with different objects in view, the shores of the sound, or, as it should be more properly called, fjord, for it extends at least fifty miles into the interior, and appears to have no connexion with Wibelan's Water or any other inlet of importance. Almost every depression on its northern side is occupied by a glacier, which generally fills it nearly to the brim, and, with but one exception, these glaciers are only terminated by the sea; but along its southern shore are some four or five bays of various sizes, and between them various valleys which, being quite free from ice, are more or less fertile and afford sufficient pasturage for numerous herds of *Rangifer tarandus*. These Deer are tolerably abundant: they are certainly smaller than the Lapland Reins, whether wild or tame; and though I can hardly profess to speak generally on the subject, yet all the antlers which I saw in Spitsbergen seemed to me to be slighter in the beam than those of the continental race; nevertheless, the points being in old stags considerably elongated, the expanse of antler was not much inferior. The average type of a good Spitsbergen head is very well represented by the first figure in the 'Fauna Boreali-Americana' (vol. i. p. 240), of the so-called Barren-ground Caribou (*Cervus tarandus*, var. *a. arctica*, Richardson); and it is probable that the same causes which influence the development of the antlers in the Rein-Deer of the *mauvaises terres* in North America affect in like manner those of their Spitsbergen brethren. These last are said, by persons who have wintered there, not to migrate from the country; at least they or their tracks on the snow are seen "as soon as it begins to get light" in spring. At the same time it is just possible that some of them may wander over the frozen sea by way

\* Öfersigt af Kongl. Vetenskaps-Akademiens Förhandlingar, 11 Febr. 1863.

of Giles Land—and other islands, perhaps, of which we have as yet no knowledge—to Nova Zembla, and so on to the country of the Samoides. Certainly a hind killed by my friend Mr. Graham Manners-Sutton had one ear slit in a manner which was recognized by some of the ‘Semmoline’s’ crew (most of them Quæns) as a mark of ownership. I must, however, add that, averse as I am to doubt the technical knowledge of an expert, the slit in question seemed to me as if it might have been very well caused by another Deer in fighting, or, even if it were of human origin, such as might have been made by some one who had caught the animal when a calf, and let it go again; but this last solution of the difficulty excited a laugh at my simplicity among the Quæns, who could not conceive it possible that a hungry hunter should show compassion towards the very youngest deer. All that we saw the first week of our being in the country still retained a considerable quantity of their nearly white winter clothing, thus rendering their detection, when viewed against the dark-coloured ground, a very easy matter even at a great distance. These animals also were in poor condition, contrasting in this respect strongly with those killed about a month later, when their bodies on being flayed were found to be covered with fat nearly two inches thick. At this time they had entirely got rid of their overcoats, and were clothed entirely in a short but close felt of dark mouse-colour. Judging from the gralloch, in the summer, lichens seem to form only a small article in their diet, their food then consisting chiefly of mosses, grasses, and any other herbage.

The Arctic Fox (*Canis lagopus*) is pretty numerous along the shores of Ice Sound; and we not only frequently saw examples of it, but in the immediate neighbourhood of the cliffs wherein the *Aleida* were nesting one could, by listening almost at any time in the twenty-four hours, hear its yapping bark. It is of course the chief enemy of all the different kinds of birds, and their dread of it appears to influence them greatly in their choice of breeding-quarters. What the Foxes do to get a living in winter when the birds have left the country—for I imagine that the Ptarmigan (*Lagopus hemileucurus*) is the only species that is permanently resident—is one of the most curious questions that has presented itself to my mind for some time. The greater number of them are said to remain on the land, and to be as active during the long polar night as they are in summer; yet there are no berries by which they might eke out their existence, and there can be no open water, on the margin of which they might find food, within miles of their haunts. The most natural explanation that occurs to one is that they lay up a stock of provisions; but nobody, that I am aware of, has ever found such a store-closet\*, or has observed any tendency to hoarding in their habits. In Spitsbergen I believe that none of the varieties known as the Blue, the Black, or the Silver Fox have been noticed. The summer pelt does

\* Since the above was written, it has occurred to me that a considerable collection of shells of *Mya truncata*, which I found one day on the moraine of a glacier in Safe Haven, may possibly have been due to the causes suggested in the text.

not differ from what it ordinarily is in other countries, and the winter coat seems to be invariably white\*.

We noticed two species of *Phocidæ* in the waters of Ice Fjord. I am indebted to Mr. Malmgren for the information that these are the *Callocephalus fœtidus* and *Phoca barbata* of Dr. Gray's 'Catalogue of Mammalia in the British Museum.' The former is called by the Norwegians who frequent the coast of Spitsbergen "Steen-Kobbe," or Stone-Seal, probably because it is usually seen near rocks, or at any rate at no great distance from land; the latter is known as "Stor Kobbe," Great Seal, or less frequently "Blaa Kobbe," Blue Seal. How this last name came to be applied to it I do not know. As far as I can judge, it is very inappropriate. When dry, its fur is of a dirty yellowish white; and a beast of this species lying on a floe has exactly the appearance of a lump of discoloured ice, so that the hunter often takes one for the other. In the water it seems to be much of the same colour as most Seals—a dark iron-grey above, lighter beneath. It is a very powerful animal: I saw one that had received three Enfield-bullets through the nape of its neck, and had been bleeding profusely for about half an hour; yet it nearly succeeded in capsizing a large whale-boat with five men in her, owing to the clumsiness of the harpooner. We constantly saw this species at a considerable distance from land—ten to twenty miles, off the west coast of Spitsbergen, mostly between Bell Sound and Ice Fjord; and a young male of the previous year was shot from the deck of the yacht, and afterwards harpooned, on the 29th July, about fifteen miles from South Cape.

We saw no other mammals in Ice Fjord. Our pilot pointed out to me one day a place where, many years ago, a *jægt's* crew, of which he himself was one, killed nine Polar Bears; but no such good fortune attended us. This same man informed me that he knew of the occurrence in Spitsbergen of a "Hermelin," a species which has not hitherto been recorded from that country, though it is probable that the "creature, somewhat larger than a weasel, with short ears, long tail, and skin spotted white and black," stated to have been seen on Low Island by Dr. Irving in Lord Mulgrave's Voyage†, was nothing else but *Mustela erminea*.

I must here mention the pleasure it was to me, and, I am sure, to all

\* I have never seen it remarked, though it is unquestionably the case, that nearly all the Icelandic examples of *Canis lagopus* are "Blue" Foxes; that is to say, their winter coat is of nearly the same colour as their summer coat. This fact, I think, must be taken in connexion with the comparatively mild climate which Iceland enjoys in winter, and, if so, is analogous to the circumstance of the Alpine Hare (*Lepus timidus*, Linn., non auct.) always becoming white in winter in Scandinavia, generally so in Scotland, and but seldom in Ireland. The Common Squirrel (*Sciurus vulgaris*) is another case in point; and all three may be considered illustrative of the vexed questions of the specific distinctions between the Great Northern Falcons (*Falco gyrfalco*, *F. candicans*, and *F. islandicus*), and of the specific identity of the Red and Willow Grouse (*Lagopus scoticus* and *L. albus*).

† 'A Voyage towards the North Pole undertaken by His Majesty's command, 1773.' By Constantine John Phipps. London: 1774, page 58.

the other members of our party, to fall in with the Swedish Scientific Expedition, who are engaged in making a series of preliminary surveys, preparatory to measuring an arc of the meridian, in Spitsbergen. To Professors Nordenskjöld and Dumér and Herr Malmgren our best thanks are due for their kindness in furnishing us with much valuable information, the results of their former arduous explorations in this distant country.

On leaving England there had been two points in the ornithology of Spitsbergen to which I had especially meant to apply myself. The first was the obtaining of a good series of specimens of the Spitsbergen *Lagopus*, a single example of which, brought from that country in 1855 by my friends Mr. W. Sturge and the late Mr. E. Evans, had been described by Mr. Gould in our 'Proceedings' for 1858 (p. 354) as a distinct species under the name of *L. hemileucurus*; the second was the determination of the large species of Wild Goose, which the same gentlemen found breeding on the shores of Ice Fjord (Ibis, 1859, pp. 171, 172). Of the latter, as I have already mentioned, we saw a considerable number; and though we failed in our efforts to obtain a specimen, yet, through Mr. Malmgren's kindness, I am able to declare that the species is *Anser brachyrhynchus*, since I saw and examined two examples in his possession. Of the first, though, I regret to say, unsuccessful in finding out its haunts, I likewise had the pleasure of being shown by Mr. Malmgren an adult male, killed but a few days previously, and still unskinned. Its plumage, however, presented scarcely any trace of the great vernal change which takes place in this group of birds; and, except that I am confident that the Ptarmigan of Spitsbergen is distinct from that of continental Europe and Britain, I hardly like to form an opinion respecting its specific distinctness from the Ptarmigan of Iceland, Greenland, and Labrador, which I am inclined to consider as forming but one species, to which the name *L. rupestris*, being the oldest, should probably be applied.

After passing an agreeable week in Ice Fjord, and being joined by our Norwegian consort, we returned southwards, and proceeded towards the most western of the Thousand Islands. Here some of our party were transhipped to go to the eastward in the *jægt* in search of Walruses, while the 'Sultana' made another attempt to ascend the Stor Fjord; but, finding the ice at a distance of about twenty miles above the bight still unmoved, she was compelled to retrace her course, and await the return of the *jægt* party off the Thousand Islands. In Stor Fjord we made the acquaintance of the third species of Seal known in Spitsbergen, the very widely distributed *Pagophilus grænländicus* of Dr. Gray's Catalogue. This animal is known to the frequenters of the coast as the "Jan-Mayen Kobbe" and "Svart-side;" but most generally as the "Springer," from its lively actions in the water. It is of a social disposition, and we saw it in herds not less than fifty in number. These were very fond of swimming in line, their heads alone above water, engaged in a game of "follow-my-leader;" for on the first Seal making a roll over, or a spring into the air, each Seal of the whole procession, on arriving

at the same spot, did the like, and exactly in the same manner. While viewing this singular proceeding (and I had many opportunities of doing so), I could not but be struck with the plausibility of one of the suggested explanations of the appearance which has obtained so wide-spread a notoriety under the name of the "Great Sea Serpent." If any rule of the game in which *Pagophilus grœnlandicus* loves to indulge ever would permit the leading Seal to swim (say) one-third out of water, as I have often seen *Phoca barbata* do, I could quite understand any person, not an unromantic naturalist, on witnessing for the first time such a sight as I have tried to describe, honestly believing that the mythical monster was actually before his eyes. I never had the opportunity of closely examining a "Springer;" but one learned immediately to distinguish this species from the other two I have mentioned: not only its wonderful activity in the water, but its elongated head (even when the size of its body, just about intermediate between *P. barbata* and *Callocephalus fœtidus*, was not to be ascertained) was quite sufficient for that purpose. This species resorts in great numbers to the ice in the neighbourhood of Jan Mayen, whence one of its common names; and in former years several vessels were annually equipped at Tromsø and Hammerfest in pursuit of it; but I believe that of late this practice has been a good deal discontinued.

Although none of our party were lucky enough to get a glimpse of a Walrus, I cannot refrain from mentioning here some circumstances connected with the history and habits of that curious and mighty beast. It is pretty well known that in the summer of 1853 a living example was deposited in our Gardens, which, however, after a few days languished and died, probably from having been fed on a diet so unnatural to it as oatcake\*. Yet this is by no means the only instance of this animal being brought alive to England. So long ago as 1608, the ship 'God-speed,' commanded by Master Thomas Weiden, performed a voyage to Cherie, now commonly called Bear Island, and in the account of the expedition it is written—

"On the twelfth [July] we took into our ship two young Morses, male and female, alieve: the female died before we came into *England*: the male liued about ten weeks. When wee had watered, we set sayle for *England* about foure of the clocke in the morning. \* \* \*

"The twentieth of August, wee arriued at *London*; and hauing dispatched some priuate businesse, we brought our liuing Morse to the Court, where the king and many honourable personages beheld it with admiration for the strangenesse of the same, the like whereof had neuer before beene seene alieve in *England*. Not long after it fell sicke and died. As the beaste in shape is very strange, so is it of strange docilitie and apt to be taught, as by good experience we often proued" †.

\* See 'Zoological Sketches,' by J. Wolf; edited by P. L. Sclater. Cf. also J. E. Gray, P. Z. S. 1853, p. 112.

† HAKLUYTUS POSTHUMUS OR PURCHAS HIS PILGRIMES, &c. By Samuel Purchas, B.D. London: 1624, vol. iii. p. 560.

Now surely what a rude skipper, in the days of James I., could without any preparation accomplish, this Society ought to have no great difficulty in effecting; and I trust that the example may not be lost upon those who control our operations. From inquiries I have made, I find it is quite the exception for any year to pass without an opportunity of capturing alive one or more young examples of *Trichechus rosmarus* occurring to the twenty or thirty ships which annually sail from the northern ports of Norway, to pursue this animal in the Spitsbergen seas. It has several times happened that young Walruses thus taken are brought to Hammerfest; but, the voyage ended, they are sold to the first purchaser, generally for a very trifling sum, and, their food and accommodation not being duly considered, they of course soon die. Lord Dufferin bought one which had been taken to Bergen, and succeeded in bringing it alive to Ullapool\*; and Mr. Lamont mentions another which he saw in the possession of Captain Erichsen†. In making an attempt to place a live Walrus in our Gardens, I do not think we ought to be discouraged by the bad luck which has attended our efforts in the case of the larger marine Mammalia. Every person I have spoken with on the subject corroborates the account given by honest Master Welden of the "strange docilitie" of this beast; and that in a mere financial point of view the attempt would be worth undertaking is, I think, manifest. To the general public perhaps the most permanently attractive animals exhibited in our Gardens are the Hippopotamuses and the Seals. What then would be the case of a species like the Walrus, wherein the active intelligence of the latter is added to the powerful bulk of the former? There is also another consideration why we should make the attempt. In a few years it is probable that the difficulties of obtaining a live example of the Walrus will be much greater. Its numbers are apparently decreasing with woful rapidity. The time is certainly not very far distant when *Trichechus rosmarus* will be as extinct in the Spitsbergen seas as *Rhytina gigas* is in those of Behring's Straits. I see no reason to doubt the assertion, or perhaps it would be safer to say the inference, that in former days Walruses habitually frequented the coasts of Finmark; in the sixteenth and seventeenth centuries they were certainly abundant about Bear Island: they are spoken of there, as "lying like hogges upon heaps" by the old writer I have before quoted; yet for the last thirty years probably not one has been seen there. Now they are hemmed in by the packed ice of the Polar Sea on the one side and their merciless enemies on the other. The result cannot admit of any doubt.

But to continue my story from this digression, which I hope, however, may not be without its use. On the 10th of August our two ships again joined company; and, finding it was useless attempting either to get up the Stor Fjord or sail further to the eastward, we again rounded the South Cape and made for the northward. The season, however, being now so far advanced, our pilot declined the

\* 'Letters from High Latitudes,' pp. 387-389.

† 'Seasons with the Sea-Horses,' pp. 26, 27.



responsibility of taking the yacht further north than Ice Fjord; and accordingly, after having to steer considerably to the westward to avoid the heavy ice which beset the coast about Horn Sound, we found ourselves, on the afternoon of the 14th, once more at our old anchorage in Safe Haven. Here we remained another week, most of our party finding plenty of occupation in deer-stalking; but I was not able to add much to my stock of zoological knowledge. The Deer were now in magnificent condition, and nineteen were shot, making, with those obtained the week the yacht was there in July, a total of forty-seven. On the night of the 17th the salt water of the Haven was frozen over, and two days afterwards the sun set. On the morning of the 21st we weighed anchor, homeward bound. On the 24th we spoke a Norwegian *jægt*, engaged in the fishing of *Scymnus borealis*, an example of which was hauled up just as we passed\*. The same day we sighted Bear Island, which on our outward voyage we had not seen, owing to the fog; and on the 27th we reached Hammerfest.

It remains for me to add a few words on the Cetaceans we saw. I have already mentioned *Beluga catodon*, which we observed also on two other occasions. This is the only species of which I can speak definitely, though we certainly saw at least four others. Of these, the first was a large black fin-backed Whale, noticed three or four times; the second a smaller animal, perhaps about thirty or forty feet long, of which some half a dozen came and played round the yacht on the 12th of August. In general form, especially in the *esocine* shape of the head, these corresponded very closely with the engraving given by Dr. Scoresby (Arctic Regions, vol. ii. pl. 13. f. 2) as that of *Balæna rostrata* (= *Balænoptera rostrata*, J. E. Gray); but I rather hesitate to refer them positively to that species, on account of their colour, which was apparently of a uniform light reddish brown. I had an excellent opportunity of observing these Whales, for they kept with us about a quarter of an hour, sometimes passing under the ship, and often coming up close alongside, within perhaps thirty yards. On the following day I saw a school of Grampuses, with extremely long and high dorsal fins; but this was the only occasion on which the species was noticed. Some kind of Porpoise, on the contrary, was seen more than once†. In addition to these

\* This fishery has of late years assumed considerable importance. The vessels employed in it mostly do not go so far north, but keep about midway between Bear Island and the North Cape of Europe. There they anchor in deep water with a light cable, which they cut if it comes on to blow suddenly. The Sharks are caught with a baited hook at the end of a very long line. As soon as one is hooked, he is hauled up on deck by a windlass, and beaten on the head until he is motionless. His liver, which alone is required of him, is then cut out; and, his entrails being fully inflated with air, his body is heaved overboard to float away quite clear of the vessel. The cause of this apparently wanton cruelty is alleged to be the difficulty of otherwise disposing of the carcase; for the fishermen say that if the animal were killed, they would not catch another Shark until the dead one was entirely eaten up by his brethren, a process that might involve a delay of some days.

† I feel very confident of the truth of this statement; but I find no mention made of any Porpoise in the Spitsbergen-seas by either Scoresby or Malmgren.

Cetaceans, the Right Whale (*Balæna mysticetus*) and the Narwhal (*Monodon monoceras*) are well known to inhabit the Spitzbergen seas. Mr. Malmgren, in his careful paper before alluded to, enumerates six or perhaps seven species of Whales, not reckoning a Porpoise. We therefore have seven or eight Cetaceans, seven Carnivores (including *Ursus maritimus*, on which I have no remark to make), and one Ruminant as the sum total of the Mammalian fauna of Spitsbergen. Without extending these notes by going into details, I may here state that I think the bird-fauna cannot be reckoned at more than twenty-seven species. We therefore have the singular result of a country, say as large as Ireland, where the number of Mammalian bears to the number of Ornithic species the ratio of 15 or 16 to 27.

13. A REVISION OF THE GENERA AND SPECIES OF VIVERRINE ANIMALS (VIVERRIDÆ), FOUNDED ON THE COLLECTION IN THE BRITISH MUSEUM. BY DR. J. E. GRAY, F.R.S.

Having received from Dr. Meller a Viverrine animal from Eastern Africa which appeared to be new, I was induced to compare it with the specimens in the Museum. Here I found two specimens received in 1855 from M. Verreaux of Paris, under the name of *Herpestes mutgigella* of Rüppell from Eastern Africa, quite different from, and three or four times as large as the adult animals of that species which were received from Dr. Rüppell as type specimens—besides another different species from the same part of the world, which we purchased of M. Parzudaki, also under the name of *Herpestes mutgigella*.

Being desirous of determining these species and some other unnamed specimens with accuracy, I was induced to reexamine all the specimens of the skins and osteological preparations that are in the British Museum, very many of which are the original specimens on which many species have been described; and as the materials grew under my hand into an essay on the species of the tribe, I have sent it to the Society in the hope that it may assist to elucidate the numerous species of this group of carnivorous Mammalia.

The *Viverridæ* include a considerable number of the middle-sized and small Carnivora. They are all natives of the Old World—that is to say, Africa and Asia (one of the species spreading itself over some of the southern parts of Europe)—except the genus *Bassaris*, which inhabits Mexico.

The greater number of the species are found in Africa, and several are confined to Madagascar; others are inhabitants of various parts

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This fact I unfortunately had not noticed until my return home; so that (Porpoises being in general of so common occurrence on a sea voyage) I neglected to record, as I otherwise should certainly have done, the dates and localities of their appearance. It is of course possible that what I took to be Porpoises were only the young of some larger Cetacean; but I do not think this was the case.

of Asia. Some species of the genera, as here revised, come from Africa, and others from Asia; but I do not know of any species but *Viverricula malaccensis* which is common to the two sections of the Old World.

The essential character of the Viverridæ is to have two tubercular grinders on each side of the upper jaw, and one on each side of the lower. In the genera *Linsang* and *Poiana* the hinder upper tubercular grinder is absent, and the teeth agree in number with those of the genus *Felis*; but the shape of the skull and teeth show that they belong to this family. In *Crossarchus* and *Suricata* the lower hinder grinder is absent; and in some species of the genera, where these teeth are present, they are often reduced to a very small size. There are generally three false grinders before the flesh-tooth; but in some genera the front one, which is often very small, is entirely wanting, or sometimes falls out early.

Mr. Waterhouse, in the 'Proceedings of the Zoological Society' for 1839, in a paper "On the Dentition of Carnivora," observes, "The *Viverridæ* have the same form of skull as the *Canidæ*, but differ in having the posterior portion more produced; the long palate is carried farther back, and the small back molar, observable in the lower jaw of the Dog, is here wanting. They have, therefore, but one true molar on either side of the lower jaw, and two true molars on each side of the upper jaw." The form of the palate here relied on is not found in all the genera of the family, and sometimes varies in genera which are very nearly allied both in external characters and dentition.

The Hyæna, Mr. Waterhouse was inclined to regard as an aberrant form of Viverridæ. Its carnassier has a large inner lobe, and in this respect also resembles the *Viverra*'s, and not the Cat's.

(See also some observations by me on the change of the teeth, &c., in some of the genera, in a paper in the 'Proceedings of the Zoological Society' for 1832, pp. 32, 62.)

There can be no doubt that the skull affords very important characters, especially for the division of the species into groups or genera, and also for the distinction of the species; but no one can examine an extensive series of skulls, even of animals obtained from the same locality, without being struck with the variation the skull presents during the growth and age of the animal, and also the variation which the specimens of the same age present, showing that the skull and the teeth are quite as liable to vary in form in each species (within certain limits, these limits being different in the various species) as any other part of the animal; so that a species cannot be said to be firmly established until the external form, the bones, and the habit of the species have been carefully studied, distinctly showing that the labours of the palæontologist in a zoological point of view are very unsatisfactory, from the necessary want of material for forming a reliable determination of species.

The late Mr. Turner made some very interesting observations on the base of the crania of the Carnivora, with a new distribution of the genera (see Proc. Zool. Soc. 1848, p. 63). It is to be regretted

that he died so young, and could not continue his researches; for I have no doubt he would have thrown great light on the structure of the skulls of this group, as he always followed my studies like a shadow. Thus when I published my "Arrangement of the Hollow-horned Ruminants" in 1846 (Ann. N. H. xviii. p. 227), he shortly after read his paper on their skulls (see Proc. Zool. Soc. 1850, p. 164); when I commenced the study of the species of Edentata by a monograph of *Bradypus* in Proc. Zool. Soc. 1849, p. 65, he read his paper on the skull of Edentata in 1851. Being an observant and careful osteologist, he observed many particulars that a general zoologist would have overlooked; but this limitation of his study confined his views; so that he would not allow such genera as *Saiga*, *Pantholops*, or *Tamandua* (which have such striking external characters), because he did not observe such differences in the skulls as he considered of generic importance.

The impulse that Cuvier gave to zoology by the study of the skeletons and teeth of Mammalia, as shown in the 'Ossemens Fossiles,' made such an impression on the succeeding students of zoology, that most of them, overlooking the importance that Cuvier himself attached to external characters, have confined themselves far too exclusively to the characters offered by these parts, overlooking the fact that bones and teeth are liable to vary like other parts of the animal, and that characters in the teeth that may be of great importance in most groups may be of comparatively little value in the others. Thus in the *Paradoxuri*, which every one must allow form a very natural group, well characterized by its habits as well as its external character, the skulls and the flesh-teeth offer such variations in form in the different species that they would be considered as good generic characters in any other tribe of Viverridæ.

The notes on the skull and teeth in this paper are always taken from those of the adult animal, unless it is stated to the contrary.

The Viverridæ have been divided into many genera, some only containing a single species, while one or two other genera have been left as magazines containing a number of heterogeneous species which had not been particularly examined. The characters of some of the published genera have not been made out on any uniform plan. Indeed that is the system of the day, to search out some animal which has some striking character, and to form it into a genus, leaving the greater number of species in the family under the old generic denomination, which, when examined with care, have quite as distinct characters. This is an evil which requires remedying, and I have tried to obviate it by submitting all the species of the group to the same kind of revision as M. Geoffroy submitted the old species when he rearranged the collection in the Jardin des Plantes more than half a century ago.

M. Temminck, in the 'Esquisses Zoologiques,' p. 100, has inquired if *H. widdringtonii* is a species or a local variety. He had never seen the animal; but this shows the spirit in which he seems always to have looked on the species described by others which were not in his museum. In the same work he gives a short *résumé* of the spe-

cies of the genera *Herpestes* and *Paradoxurus*, and states that the catalogues are encumbered with many double and triple *emplois*, which must be erased from the systematic catalogue. After citing some examples of species which have been described nearly simultaneously by zoologists living in distant countries, as *H. urinator*, *H. paludosus*, *H. penicillatus*, and *Cynictis steedmani* (which certainly are not instances deserving much blame, especially when we consider the many cases in which M. Temminck himself has described species in Holland which had been long previously described in England), he proceeds to propose to unite some species which are, in my opinion, perfectly distinct (some even belonging to different sections of the genus) according to characters that are almost universally adopted, and which he himself uses in other places. In the revision of the genus *Paradoxurus* in his monograph, and again in the above work, he has united together species which have not the slightest relation to each other, and which he never could have united if he had seen authentic specimens of them. Thus he unites *P. grayi*, *P. nipalensis*, and *P. laniger* to *P. larvatus*, and *P. crossi* and *P. pallasii* to *P. musanga*, regarding *P. bondar* as separate. Now if he had united *P. grayi*, *P. nipalensis*, *P. laniger*, *P. crossi*, and *P. bondar* together, he would have had the excuse that they all have some similarity of external appearance; and he might have been misled if he had only casually looked at them through the glass of the cases in the museum, as he looked at some specimens which he says he saw when in England. Synonyms cannot be determined by such an examination, nor is science advanced by such assertions.

M. Temminck was an eminent ornithologist, and has studied some groups of Mammalia, perhaps not with so much success. He was an amiable naturalist, but has carried his political anglophobia (so well seen in his 'Essay on the Dutch Colonial Possessions') into his zoological studies. This blinded him to the labours of the zoologists of this country, the richness of our collection, and thus rendered his observations in regard to their work not worthy of attention, as they otherwise might have been. It is to be observed that he never had a regular scientific training, never attempted to form scientific specific characters, and is rather to be regarded as a patron and amateur than as a scientific zoologist. He was the first in his country, as the late Earl of Derby was in this.

The arrangement of the genera of Viverridæ into natural groups is not easy; for though they naturally place themselves together in a certain kind of order, the difficulty is to find a character that is common to the genera that appear to be most related to each other.

I published an arrangement of the genera of this family then known, according to the characters afforded by the hairiness and baldness of the sole of the hind feet, in the 'Proceedings of the Zoological Society' for 1832, p. 63, which is well adapted for the purpose, though, like other arrangements, it is not infallible, nor to be used too strictly, or it will separate genera naturally allied to each other.

The continued study of the subject has shown me several other

characters which I had before overlooked. I propose the following arrangement as one which seems best adapted to exhibit the natural affinities of the genera, as far as they can be shown in a linear series, and as one that will enable the student to determine the species. Thus, for example, I would propose to divide the tribes characterized in the paper (in the 'Proceedings of the Zoological Society') above referred to into two groups, according to the form and the hairiness of the toes and the form of the claws, characterized by the foot and claw of the Cat and of the Dog or the Bear.

The bones of the toes of the animals of the first group, as in the Cats, form an angularly arched line, the last phalanges being bent up, so that the animal when it walks does not blunt its claws, which are only exerted when it wants to catch or tear some other animal. In the second group, which I have called *Dog-footed*, the bones of the toes form a more or less extended, slightly arched line; and the claws, being always exposed, and worn when the animal walks, are more or less blunt at the end. The more typical Dog-footed animals often scratch holes in the ground; and some have strong elongated arched claws for the purpose.

The groups are well defined and very distinct, and the above characters are well marked in most of the genera; but some few genera have feet that seem nearly intermediate between the two groups. In such cases the whole appearance of the animal must be taken into consideration, and the genera placed with those to which they seem most allied in habit and manners.

The difference in the form of the foot and claws is common to three families of the Carnivora; and, as it is connected with considerable peculiarity in the habit of the animal, it forms a good character to separate the tribes and genera into groups, thus:—

VIVERRIDÆ.	URSIDÆ.	MUSTELIDÆ.
A. <i>Toes arched; claws acute, retractile.</i>		
<i>Eluopoda.</i>	<i>Dendropoda.</i>	<i>Acanthopoda.</i>
Viverrina.	Ailurina.	Mustelina.
Genettina.	Cercoleptina.	Lutrina.
Paradoxurina.	Procyonina.	
B. <i>Toes straight; claws exerted, blunt.</i>		
<i>Cynopoda.</i>	<i>Brachypoda.</i>	<i>Platypoda.</i>
Herpestina.	Ursina.	Mephitina.
Mungosina.		Mydaina.
		Melina.

The genera of the three other families of Carnivora have a uniform kind of foot. Thus the *Felidæ* have a hairy foot, curved toes, and sharp claws; and the *Canidæ* and *Hyenidæ* straight toes and exerted, blunt claws.

The animals of the different families which have sharp retractile claws have habits in common. Thus the Cats, the Genets, the *Paradoxuri*, the Martins, the *Ailuri*, and the *Cercoleptæ* defend them-

selves by lying on their back and using both the hind and front feet to claw with; they walk softly, and jump on their prey.

The animals with exerted claws generally scratch the ground into holes, and defend themselves with their front feet; and some, as the Suricate and the Bears, sit on their haunches; and the Bear, the Coatimondi, the Raccoon, &c. use their fore feet as hands to take their food, as well as in defence.

*Synopsis of the Genera.*

1. The Cat-footed (*Æluropoda*). *The toes curved, arched, hairy, webbed; claws sharp, retractile.*

A. Typical. Digitigrade. *The underside of the feet hairy, except the pads, metatarsus, and sometimes a small part of the tarsus. Upper flesh-tooth elongate; upper tubercular grinder small, transverse. Nose short; underside flat, with a central groove.*  
Viverracea.

1. *Body robust; tubercular grinders 2/1, 2/1; back of tarsus hairy.*  
Viverrina.

PROTELES. Legs elongate; front longest. Head short, broad; ears long. Tail short, bushy. An anomalous genus allied to *Hyæna*.

VIVERRA. Legs moderate, equal. Head elongate. Tail conical, ringed. Back crested. Orbit of skull incomplete.

BASSARIS. Tail cylindrical, ringed. Legs equal, moderate. Back not crested. Orbit of skull incomplete.

VIVERRICULA. Legs moderate, equal. Tail conical, ringed. Back not crested; heel with a small bald spot. Orbit of skull complete.

2. *Body robust; tubercular grinders 2/1, 2/1; underside of the tarsus with a narrow naked streak.* Genettina.

GENETTA. Back with a black suberectile streak.

FOSSA. Back without any central streak.

3. *Body slender, elongate; tubercular grinders 1/1.* Prionodontina.

POIANA. Back of tarsus with a narrow naked streak.

PRIONODON. Back of tarsus hairy.

B. Aberrant. Subplantigrade. *The underside of the toes and more or less of the back of the tarsus naked, callous. Flesh-tooth strong, upper tubercular grinders large, broad.*

1. *Nose produced; underside convex, hairy, without any central longitudinal groove; hinder part of the tarsus bald, callous. Face produced.* Cynogalina.

CYNOGALE. Tail short, cylindrical.

2. *Nose short, underside flat, with a central groove.*

a. *The hinder part of the tarsus hairy to the palm ; the tail bushy.*  
Galidiina.

GALIDIA.

b. *The upper part of the hinder part of the tarsus hairy ; tail ringed.* Hemigalina.

HEMIGALEA.

c. *The hinder part of the tarsus bald, callous.*

\* *Tail thick, strong, prehensile.* Arctictidina.

ARCTICTIS.

\*\* *Tail very long, subconvolute ; frenum naked, glandular ; head elongate.* Paradoxurina.

PARADOXURUS. *Flesh-tooth elongate, triangular ; tubercular teeth oblong. Orbit very incomplete.*

PAGUMA. *Flesh-tooth short, triangular, large. Orbit very imperfect.*

ARCTOGALE. *Flesh-tooth triangular, small. Orbit nearly complete. Palate very narrow, elongate.*

NANDINIA. *Flesh-tooth elongate, triangular ; tubercular teeth triangular, transverse. Orbit rather incomplete. Palate narrow, short.*

\*\*\* *Tail long, bushy ; head short, broad ; frenum hairy ?*  
Cryptoproctina.

CRYPTOPROCTA.

II. *The Dog-footed (Cynopoda). The toes elongate, separate, more or less hairy ; claws exerted, blunt ; feet narrow, underside bald or only covered with short hairs. Orbit of skull complete, or nearly complete, behind.*

Λ. *Nose short ; underside flat, with a central groove.* Herpesteacea.

1. *Head elongate, conical ; tail conical or cylindrical.* Herpestina.

\* *Front claws elongate, compressed ; back streaked.*

GALIDICTIS. *Toes 5-5. Tail subcylindrical, covered with long hair. Back striped.*

\*\* *The front claws short, compressed ; back grizzled ; flesh-tooth long, narrow.*

HERPESTES. *Toes 5-5. Tail conical, with long hair. Teeth moderate.*

ATHYLAX. *Toes 5-5. Tail conical, with long hair. Teeth very large.*



CALOGALE. Toes 5-5. Tail cylindrical, elongate, covered with shortish hairs; tip pencilled.

GALERELLA. Toes 5-4. Tail cylindrical, elongate, covered with short hair.

\*\* *The front claws short, compressed; flesh-tooth broad, triangular.*

CALICTIS. Toes 5-5. Tail conical, with long hairs. Back grizzled. Pupil oblong, transverse.

ARIELA. Toes 5-5. Tail elongate, subcylindrical. Back cross-banded.

ICHNEUMIA. Toes 5-5. Legs rather high. Tail conical, bushy. Back grizzled.

? BDEOGALE. Toes 4-4. Legs moderate. Tail conical, bushy. Back grizzled. Soles hairy?

\*\*\* *Front claws elongate, produced; tail conical, with long hair; back grizzled.*

URVA. Toes 5-5. Head elongate. Soles of hind feet hairy. False grinders  $3/4$ .

TÆNIOGALE. Toes 5-5. Head elongate. Soles of hind feet bald. False grinders  $3/4$ .

ONYCHOGALE. Toes 5-5. Head elongate. Soles of hind feet hairy. Front claws very long. False grinders  $3/4$ .

HELOGALE. Toes 5-5. Nose short. False grinders  $2/3$ . Body slender. Soles bald.

2. *Head short, ventricose; tail bushy, expanded laterally; claws elongate.* Cynictidina.

CYNICTIS. Toes 5-4.

B. *Nose produced; underside convex, hairy, without any bald central groove.* Rhinogaleacea.

1. *Head elongate; nose short; teeth 40; false grinders  $3/4$ .*  
Mungosina.

RHINOGALE. Tail conical. Toes 5-5. Front claws short.

MUNGOS. Tail conical. Toes 5-5. Front claws elongate.

2. *Head ventricose; nose elongate; teeth 36; false grinders  $3/3, 3/3$ .*  
Crossarchina.

EUPLERES. Toes 5-5. Claws short, hooked. Hind soles hairy.

CROSSARCHUS. Toes 5-5. Claws hooked. Hind soles bald.

SURICATA. Toes 5-4. Claws elongate, slender. Hind soles hairy.

The shortness of the characters that I give to some genera has been objected to by some writers, especially by amateurs who have not studied the Linnean brevity and method of description. They overlook the fact that the characters of the sections and subsections of the family that precede the genus form an essential part of the generic character, in the same manner that the section of the genus is part of the specific character of the species that the section contains. The definition of the subsections of the families and genera requires more study, analysis, and consideration than the writing out of a long generic character, that contains particulars that are common to a number of allied genera, such as the writers who make the complaint usually give. At the same time, the use of such detailed characters requires a greater exertion on the reader's part to eliminate the essential particulars, which are the real characters of the group. In the above table, the most easily seen and often empirical characters are purposely chosen, for facility of use and brevity. I have even used the colour of the animal for this purpose; for it has a great influence on the formation of a natural genus—more than many zoologists are willing to admit. Even those who know this fact avoid making use of it, apparently fearing that it might not be considered scientific! In the body of the essay, longer generic characters are given. Those who object to analytic characters forget the immense number of animals now known, and the great advantage of a rapid way of discovering the name of the animal they seek, and whose history they desire to know. As Mr. W. S. Macleay justly observes, "the modern art of describing is too long, often insufferably long, while human life remains as short as ever."—*Illust. Zool. South Africa*, p. 54.

### I. THE CAT-FOOTED VIVERRIDÆ (*Æluropoda*)

have broad feet, with short arched toes, covered with abundant close-spreading hair, united together at the base by a more or less distinct web, and armed with short, sharp, retractile claws. They are covered with a soft elastic fur, except the anomalous genus *Arctictis*, which has a very harsh fur and a prehensile tail.

- A. Digitigrade. *The underside of the hind feet hairy, except the pads of the toes, the metatarsus, and sometimes a small part of the tarsus; the upper flesh-tooth elongate; upper tubercular small, transverse; nose short, underside flat, with a central groove.*

#### Tribe 1. VIVERRINA.

*The body robust; tubercular teeth 2/1, 2/1; the back of the hind feet hairy, except the pad of the toes and the metatarsus.*

There is a deep pouch for secreting civet, in the form of a deep cavity on each side of the anus (P. Z. S. 1832, p. 63).

All the genera of this tribe are restricted to the Old World, except *Bassaris*, which is American. This American group is peculiar in

having two tubercles on the inner lobe of the flesh-tooth, while this tooth in all the other genera has only a single lobe on the crown of that process of the tooth.

### 1. PROTELES.

Head short, broad; muzzle truncated; ears long and pointed. The body short; neck and back crested; legs elongate, front longest; tail short, bushy. Toes 5—4. Teeth 32; false grinders  $\frac{1-1}{1-1}$ ; tubercular grinders 2/1. Looks like a small *Hyæna*, with the teeth of a Civet.

*Proteles*, I. Geoff. Mém. Mus. ii. 370, 1824; Ann. Sci. Nat. viii. 252; A. Smith, S. Afr. Q. Journ. i. 48.

#### PROTELES CRISTATUS.

B.M.

*Proteles cristatus*, Gray, Cat. Mam. B. M. 47; Gerrard, Cat. Ost. B. M. 70.

*P. lalandii*, I. Geoff. Mém. Mus. xi. 370, t. 20; Mag. Zool. 1841, i. t. 30; Fischer, Syn. Mamm. 195; Schinz, Syn. Mamm. i. 424.

*Viverra cristata* (*Grey Jackal*), Sparrm. Voy. ii. 177.

*P. typicus*, A. Smith, S. A. Q. J. i. 48.

*Viverra ? hyænoïdes*, Cuvier, MS.; Desm. Mamm. 538.

*P. hyænoïdes*, Blainv.

*Genette hyenöide*, Cuv. Oss. Foss. iv. 388.

*Proteus*, Edinb. Phil. Journ. ii. 103.

*Hyæna Genet*, Griffith, A. K. t.

*Hab.* S. Africa: Cape (called "Nadron"); Natal (*A. Smith*), ("Aard Wolf").

"Female lighter; under fur less abundant."—*A. Smith*.

### 2. VIVERRA.

*Viverra*, Linn.; Gray, P. Z. S. 1832, p. 63.

Head long; muzzle acute; pupil oblong, vertical. Neck with large black and white marblings. Body short, compressed; back black-crested; legs moderate, equal; tail moderate, tapering, ringed. Toes 5—5; claws semiretractile. Teeth 40; false grinders  $\frac{3-3}{3-3}$ .

*Hab.* Africa and Asia.

\* *Tail black.* African.

#### 1. VIVERRA CIVETTA.

B.M.

Tail black; sides spotted.

*Viverra civetta*, Schreb. Säungeth. t. 111; A. Smith, S. A. Q. J. i. 44; Bennett, Tower Menag. 99, fig.; Gray, Cat. Mam. B. M. 47; Gerrard, Cat. Ost. B. M. 70; Schinz, Syn. Mamm. i. 361; Temm. Esq. Zool. 88.

*Civette*, Buffon, ix. 299, t. 34.

Var.? *Viverra poortmanni*, Pucheran, Rev. et Mag. Zool. vii. 154, 1853; Arch. der Naturg. 1856, p. 41.

*Hab.* Africa: Abyssinia; Fernando Po (*Thompson*); Guinea (called "Kaukans") (*Temm.*); Gaboon (*Aubry Le Comte*).

\*\* Tail black, ringed. Asiatic.

2. VIVERRA ZIBETHA.

B.M.

Tail ringed.

*Viverra zibetha*, Liun. S. N. i. 65; Fischer, Syn. Mamm. 168; Gray, Illust. Ind. Zool. ii. t. 5; Proc. Zool. Soc. 1832, p. 63; Cat. Mamm. B. M. 47; Gerrard, Cat. Ost. B. M. 71; Schinz, Syn. Mamm. i. 362; Horsfield, Cat. Mus. India House, 54.

*Meles zibethica*, Liun. S. N.

*Viverra undulata*, Gray, Spic. Zool. t. 8.

*V. civettoides*, *V. melanurus*, *V. orientalis*, Hodgson, J. Asiatic Soc. Bengal, x. 909.

*Zibet*, Buffon, ix. 299, t. 31.

*Hab.* Asia: Bengal (*Horsfield*); India (*Hardwick*); Calcutta (*Oldham*); Nepal (*Hodgson*); China (*J. Reeve*); Formosa (*Swinhoe*); ? Isle of Negros (*Cuming*) (skull B.M.); ? Malay peninsula (*Horsfield*).

Skull elongate, narrow. Nose compressed. Orbit incomplete behind. Teeth very like *Genetta*; upper hinder tubercular small, oblong, transverse, with two outer and one large inner tubercle. Lower jaw shelving in front; lower edge rather arched, without any tubercles below the end of the tooth-line; the tubercular grinders subcircular, with three lobes on the crown.

3. VIVERRA TANGALUNGA.

B.M.

Tail black above, and ringed on the lower side.

*Viverra tangalunga*, Gray, P. Z. S. 1832, p. 63; Cat. Mamm. B. M. 48; Cantor, Mamm.; Horsfield, Cat. Mus. India House, 57.

*Viverra zibetha*, Raffles, Linn. Trans. xiii. 231; F. Cuvier, Mam. Lithog. t.

*Hab.* Sumatra (called "Tangalung") (*Raffles*); Borneo, Celebes, Amboyna (*Müller*); Malayan peninsula (*Cantor*).

What is *Viverra megaspila*, Blyth, Journ. Asiat. Soc. Bengal, 1862, p. 321?

3. BASSARIS.

*Bassaris*, Licht. Isis, 1831, p. 510.

Body elongate; back not crested. Legs moderate, equal. Tail elongate, bushy, dark-ringed. Toes 5—5, separate; claws acute. Teeth 38; false grinders  $\frac{2-2}{3-3}$ ; tubercular grinders  $\frac{2-2}{2-2}$ .

*Hab.* Mexico.

BASSARIS ASTUTA.

B.M.

Fur grey.

*Bassaris astuta*, Licht. Isis, 1831, p. 510; Darst. Säugeth. t. 42;

Gray, Cat. Mam. B. M. 50; Gerrard, Cat. Ost. B. M. 72; Baird, Mamm. N. Amer. t. 74. f. 2; Mexico, 13; Eydoux, Voy. Bonite, t. (skeleton); De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Tepe maxthalon*, Hernand, Voy. Fav. t. 4 & 18.

Var. *fulvescens*. Far more fulvous, perhaps of a different season. B. M.

*Bassaris sumichrasti*, De Saussure, Rev. et Mag. de Zool. 1860, p. 5, t. 1.

*Hab.* Mexico (called "Cat Squirrel," often domesticated) (*Philips*).

Skull ovate, rather produced in front, more compressed. Orbits large, incomplete behind; lower edge confluent with the zygomatic arch; zygomatic arch slender, short, and much bowed out. The brain-case swollen; the contraction rather in front of the hinder edge of the orbit. The teeth normal. False grinders  $\frac{2}{4}$ ,  $\frac{2}{4}$ , the upper compressed, second without any internal lobe. The flesh-tooth triangular; inner lobe broad, on the inner side of the front edge, with two distinct conical tubercles; outer side about one-third longer than the front margin. The tubercular grinders large, rather broader than long, with four small tubercles on the outer and three on the inner side; inner edge rounded; the hinder tubercular oblong, transverse, like the former one, but smaller. The lower jaw shelving in front; the lower edge arched; the tubercular grinders large, oblong, longitudinal, with two large tubercles on the front and two smaller in an oblique line on the hinder part of the crown. Length of skull  $3\frac{1}{4}$  inches; width of the brain-case  $1\frac{1}{3}$  inch, of the zygomatic arch  $2\frac{1}{2}$  inches.

De Saussure's figures represent the animal as if it were spotted, and the tail with only a few broad rings.

#### 4. VIVERRICULA.

*Viverricula*, Hodgson, Journ. Asiat. Soc. Beng. x. 909.

Head tapering. Throat with lunate dark bands. Body elongate; back not crested. Legs moderate, equal. Tail almost as long as the body, tapering, dark-ringed. Toes 5—5; claws acute, compressed. Pupil oblong, vertical. Teeth 40; false grinders  $\frac{3-3}{3-3}$ ; flesh-tooth longer than broad in front, inner lobe on the front margin; tubercular grinders  $\frac{2-2}{2-2}$ .

*Hab.* Asia.

Like a Genet, but with hairy soles to the feet, a shorter tail, and no crest. Foot with a small bald spot on the side of the palm-pad (see Hodgson, J. A. S. B. t. 31. f. 8).

#### VIVERRICULA MALACCENSIS.

B. M.

Grey; back with seven black or dark streaks more or less broken up into spots; shoulders, sides, and legs spotted; feet deep brown and black; tail with seven or eight black rings.

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*Viverricula malaccensis*, Cantor, Cat. Mam. Malay. 29.

*Viverra malaccensis*, Gmelin, S. N. 92 (from Sonn.); Gray, Cat. Mamm. B. M. 48; Gerrard, Cat. Ost. B. M. 70.

*V. gunda*, Hamilton, Buchanan, Icon.

*V. rasse*, Horsf. Zool. Java, t. ; P. Z. S. ii. (1832), p. 23; Schinz, Syn. Mamm. i. 362.

*V. indica*, Geoff. MS.; Fischer, Syn. Mamm. 171; Desm. Mamm. 210; Gervais, Mag. Zool. 1835, p. 10, t. 19; Horsf. P. Z. S. ii. (1832) p. 23.

? *V. bengalensis*, Gray, Illust. Ind. Zool. i. t. 4.

*V. leveriana*, Shaw, Mus. Lever. t. 21.

*Genetta manillensis*, Eydoux.

*G. indica*, Lesson, Man. 174.

*Genette rasse*, F. Cuvier, Mamm. Lithogr. t.

*Civette de Malacca*, Sonnerat, Voy. ii. 144, t. 91.

*Viverricula indica*, Hodgson, Journ. Asiat. Soc. Beng. x. 909; Calcutta J. N. H. ii. 47.

Var. (paler spots less distinct). *Viverra pallida*, Gray, Proc. Zool. Soc. ii. 63; Illust. Ind. Zool. ii. t. 6; Cat. Mam. B. M. 48; Gerrard, Cat. Ost. B. M. 71; Swinhoe, P. Z. S. 1862.

*Hab.* Asia; Madras (*Elliot*); Gangootra, Nepal (*Hodgson*); Java (*Horsfield*).

Dr. Horsfield believed there were two species combined under this name (see Proc. Zool. Soc. ii. 23, 1832):—

*V. rasse*. Back with eight *broad* longitudinal lines; the three lateral lines on each side interrupted and obscure.

*V. indica*. Back with eight *narrow* longitudinal lines; the lateral lines continued.

I formerly thought that *V. pallida* from China, in which the spots and stripes are very indistinct, might be different; but a series of specimens from different localities seems to show a gradation from one to the other.

This species differs very much in colour from different localities and perhaps in different seasons. The stripes and spots are sometimes very black and distinct; at others, as in *V. pallida*, they are very indistinct, scarcely to be distinguished from the general colour of the fur.

The skull elongate, compressed; nose compressed. The orbit imperfect behind, confluent with the temporal fossæ. Grinders:—false  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; front upper small, compressed; the third rather thicker, without any internal lobe; the flesh-tooth trigonal, oblique, elongate, half as long again as the width on the front margin—the internal lobe trigonal, on the inner side of the front edge; the front tuberculars trigonal, outer side oblique; front edge rather wider than the length of the outer margin; the hinder tubercular subcircular, with three lobes. The lower jaw slender; lower edge slightly curved, without any prominence under the end of the tooth-line; the tubercular grinders subcircular, with three nearly equal lobes.

Length of skull  $3\frac{3}{4}$  inches; width of brain-case  $1\frac{1}{6}$  inch, at zygomatic arches  $1\frac{3}{4}$  inch.

I wrote to my excellent friend Dr. Peters to inquire if the *Tunga* of Anjuan could be the *V. fossa*, and if it was not a *Genetta*. He assured me that it agrees in all particulars with the Indian *V. rasse*, and, "like it, has no bald streak along the sole. It has a hairy sole to the hind feet, and a small callous spot to the pads of the palms towards the heel."—*Letter*, 24th Nov. 1864.

Dr. Peters regards the animal called the *Tunga*, which is common on the island of Anjuan, one of the Comoro Islands, near Madagascar, on the east coast of Africa, as the same as the *Viverra rasse* of Dr. Horsfield: he says it agrees with it in colour, in the form of the ears, and in the bristly quality of its fur; and it has the soles of its feet covered with hair as in that animal. He also observes that the fauna of these islands agrees more with those of Madagascar and India than with that of continental Africa (see Peters, *Reise nach Messamb.*, Mammalia, 113). If the animal is identical, it is the only species of the family I know common to Asia and Africa.

#### Tribe 2. GENETTINA.

*The body robust; tubercular grinders 2/1, 2/1; the underside of the tarsus of the hind feet with a narrow bald line extending from the pads nearly to the heel. The orbit of the skull is very imperfect, only contracted above. The fur is soft, spotted or cloudy, and the tail ringed.*

#### 5. GENETTA, CUV. Mamm. Lithog.

*Genetta*, Brisson, R. A. 252; Gray, P. Z. S. ii. (1832) p. 63.

*Viverra*, § *Genetta*, Cuvier, R. A.; Gray, Proc. Zool. Soc. 1832; Cat. Mamm. B. M. 49.

The body elongate; back with a broad, continued, more or less crested, black streak. Tail long, slender, hairy, ringed. Legs moderate. Feet hairy. Toes 5—5; the sole of the hind foot with a narrow longitudinal bald streak. Claws short, retractile. Skull elongate, narrow. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth elongate; tubercular grinders  $\frac{2-2}{1-1}$ .

*Hab.* Africa and South Europe.

Sir A. Smith observes, "They strike and scratch with the fore feet, like a cat. They spring on their prey, and climb with great facility."

The form and colour of the tail seem the best characters for the distinction of the species; the pale bands even vary a little in width and distinctness. The form, colour, and disposition of the spots vary much; they are sometimes confluent.

\* *Tail tapering, with elongate, rather spreading hairs, and with numerous black and white rings; tip white.*

#### 1. GENETTA VULGARIS.

B.M.

Blackish grey, black-spotted; tail elongate, with white and black

rings of nearly equal length, the tip whitish; vertebral line black, subcristate; the fore legs and the feet grey, black-spotted; the hind legs black behind near the hock.

*Genetta vulgaris*, Gray, P. Z. S. ii. (1832) p. 63; Lesson, Man. 173; Gerrard, Cat. Ost. B. M. 71.

*Viverra maculata*, Gray, Zool. Misc. 9, t. 9; A. Smith, S. African Quart. Journ. ii. 136.

*G. afra*, F. Cuv. Mamm. Lithogr. t.

*Viverra genetta*, Linn.; Fischer, Syn. Mamm. 169.

*Genetta bonapartei*, Loche, Mag. Zool. 1857, t. 18.

*Hab.* South Europe, North Africa, and Asia: in B. M., from Nismes (*Verreaux*); Madrid, Algiers (*Loche*); Tangiers (*Favier*); Barbary (*Gray*); Asia, Mount Carmel (*Tristram*).

The length of the rings varies in different specimens, depending on the length of the hairs of the tail. In some, two or more of the rings are more or less confluent, especially on the upper part and near the end of the tail.

I cannot find any difference between the specimens from Europe, Algiers, Tangiers, and Mount Carmel. The distinctness and darkness of the streak upon the forehead differs in specimens from the same localities.

## 2. GENETTA FELINA.

B.M.

Blackish grey, black-spotted; vertebral line black; tail elongate, white-and-black ringed, rings of nearly equal length; tip whitish; the outer side of the fore and hind legs black; feet blackish.

*Genetta felina*, Gray, Proc. Zool. Soc. ii. (1832) p. 63; Cat. Mamm. B. M. 49; A. Smith, S. A. Quart. Journ. i. 47.

*Viverra felina*, Thunb. Sv. Akad. xxxii. 166, t. 7; Fischer, Syn. Mamm. 170; Temm. Esq. Zool. 92.

*G. vulgaris?*, A. Smith, S. Afr. Quart. Journ. ii. 45.

*Hab.* South Africa: Cape of Good Hope (*Verreaux*) (the Musk-cat of the colonist); Latakoo, common (*A. Smith*).

The chief difference between this and *G. vulgaris* is that the legs and feet are blacker, the head is darker, with a more distinct black streak up the forehead between the eyes.

*Genetta rubiginosa*, Pucheran (Rev. et Mag. de Zool. vii. 1855, 154; Arch. für Naturg. 1856, p. 44:—

“*Griseo-albescens, fulvo lavata, maculis dorsalibus fere toto rubiginosis; cauda ad basim quatuor annulis rubiginosis, quatuor deinde nigris prædita.*

“*Hab.* Cape of Good Hope”—*J. Verreaux*), is probably the same.

## 3. GENETTA SENEGALENSIS.

B.M.

Pale yellowish grey, brown-spotted; vertebral line black, subcristate behind; tail elongate, slender, yellow-and-black ringed, the pale rings the longest; tip of tail pale; the hinder part of the hind legs blackish or dark brown.



*Genetta senegalensis*, Gray, P. Z. S. ii. (1832) p. 63; Cat. Mamm. B. M. 49; Gerrard, Cat. Oss. B. M. 71.

*Viverra senegalensis*, Fischer, Syn. 170 (from F. Cuv.); Temm. Esq. Zool. 92.

*Genette de Sénégal*, F. Cuv. Man. Lith. t. .

?*Genetta aubryana*, Pucheran, Rev. et Mag. de Zool. vii. (1855) p. 154; Arch. für Naturg. 1856, p. 44.

*Fossane*, Brown, Illust. t. 43.

*Hab.* West Africa: Senegal (*Verreaux*); ? Gaboon (*Aubry le Comte*); Sennaar (*Brit. Mus.* 46, 6, 15, 43). East Africa: Abyssinia (*B. M.* 44, 5, 17, 27); Dongola (*B. M.* 46, 9, 2, 27). North Africa (*B. M.* 43, 12, 28, 2).

Skull tapering in front; nose compressed. Orbit very large, very incomplete behind; the zygomatic arch confluent with the lower edge of the orbit, moderate. False grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; upper rather far apart, front small, second compressed, with a small lobe on each end; third compressed, with a small lobe on the middle of the inner side and one at the hinder end. The flesh-tooth triangular, much longer than the breadth at the front edge, with a moderate-sized internal lobe rather behind the front inner angle. The tubercular grinders trigonal, with a sloping outer edge; the front twice as wide as long on the outer edge; the hinder small. The lower jaw slender, erect, with a shelving chin or short symphysis and a curved lower edge without any tubercles under the end of the tooth-line; the tubercular grinder roundish, with two large anterior lateral and a similar-sized posterior central lobe. Length of skull  $3\frac{1}{6}$  inches; width of brain-case  $1\frac{1}{2}$ , at zygoma  $1\frac{5}{8}$ .

**\*\*Tail subcylindrical, with shortish fur; end black, with imperfect rings; tip black, base with alternate, equally long, black and white rings.**

#### 4. GENETTA TIGRINA. B. M.

Grey brown, with black spots, the larger more or less brown in the centre; the hind feet darker; the tail elongate, cylindrical, black, with rather broad white rings, narrower than the black one; tip of tail black.

*Genetta tigrina*, Gray, Cat. Mamm. B. M. 49; Gerrard, Cat. Ost. B. M. 71; A. Smith, S. Afr. Q. Journ. i. 46.

*Viverra tigrina*, Schrb. Säugeth. t. 115; Fischer, Syn. Mamm. 170.

*Genetta vulgaris*, Rüppell.

*G. amer*, Rüppell; Gray, Cat. Mamm. B. M. 49.

*G. abyssinica*, Rüppell, Fauna Abyss. t. 11.

*Viverra abyssinica*, Gerrard, Cat. Oss. B. M. 71; Schinz, Syn. Mamm. i. 364.

*Viverra genetta*, Peters, Mossamb. Mamm. 113.

*Hab.* South Africa: Cape of Good Hope (the Musk-cat of the colonists); Natal and East Africa (*Verreaux*); Mozambique (*Peters, Kirk*); Abyssinia (*Rüppell*).

\*\*\* *Tail subcylindrical, with shortish fur, black; middle part with some imperfect rings beneath, the base with a few narrow white rings.*

5. GENETTA PARDINA. The Berbe.

B.M.

Fur reddish grey brown, with black spots more or less brown in the centre; the feet and hinder part of hind legs brown; tail elongate, covered with shortish hairs, with narrow pale or reddish rings on the basal half, black at the end, with very indistinct narrow or pale rings.

*Genetta pardina*, I. Geoff. Mag. Zool. 1832, t. 8; Gray, Cat. Mamm. B.M. 50; Temm. Esq. Zool. 93.

*Genette pantharine*, F. Cuvier, Mamm. Lithogr. t.

*Genetta poënsis*, Waterhouse, Proc. Zool. Soc. 1838, p. 59 (from a flat skin); Schinz, Syn. Mamm. i. 366.

*Viverra genettoides*, Temm. Esq. Zool. 89, 1853?

*Genetta fieldiana*, Du Chaillu, Proc. Boston N. H. Soc. vii. (1860) p. 302; Gray, Ann. & Mag. N. H. viii. 60; Arch. f. Naturg. 1862, p. 128 (from the Gaboon).

*G. servalina*, Pucheran, Rev. et Mag. de Zool. vii. (1855) p. 154; Arch. für Naturg. 1856, p. 44.

*Berbe*, Bosmann, Voy. Guinea, 31. f. 5; Buffon, H. N. xiii.

*Hab.* Fernando Po (*Waterhouse*); Guinea (*Temm.*); Gaboon (*Du Chaillu*); West Africa (*B.M.*); interior of Senegal (*I. Geoffroy*).

The specimens vary considerably in the size of the spots; in some they are brown with black edge, in others almost uniformly black; but I can see no characters by which they can be separated.

*Genetta poënsis* seems to be the same variety as that described by I. Geoffroy and M. Du Chaillu.

6. FOSSA.

The back without any black subcrested vertebral streak; the soles of the hind feet hairy, with —————?

FOSSA DAUBENTONII.

*Viverra fossa*, Schreb. Säugeth. t. 114 (from Buffon); Fischer, Syn. Mamm. 170; Schinz, Syn. Mamm. i. 369.

*Genetta fossa*, Gray, P. Z. S. 1822; A. Smith, S. Afr. Q. Journ. i. 46; Lesson, Mamm. 174; Pucheran, Ann. & Mag. N. H. 1855, p. 41.

*Fossane*, Buffon, H. N. xiii. 163, t. 20.

*Hab.* Madagascar (*Mus. Paris.*).

“Fur grey black, rufous-varied, a white spot over the hinder angle of the eye; back and nape with black lines, four of which extend from the nape to the tail, continuous to the middle of the back, and the last of their length broken into very close spots; the sides, shoulders, and thighs with spots placed in three lines on each side; lips, chin, and beneath dirty white; tail with many narrow half-rings, of a reddish colour, which do not extend to the lower side;

feet yellowish white. Length of body and head 17 inches; of tail  $8\frac{1}{2}$  inches. There are no subcaudal glands.

“*Hab.* Madagascar (*Poivre, Mus. Acad. Sci.* 1761).”—*Buffon, H. N.* xiii. 163, t. 21.

I do not know any other description of this species; that of all other authors, including Dr. A. Smith, is a mere copy of the above. There does not appear to be any central dorsal stripe, so characteristic of the Genets; the soles of the front feet have not been described.

### Tribe 3. PRIONODONTINA.

*Body slender, elongate; limbs very short; tubercular grinders 1/1; fur soft, close, erect; the tail very long, cylindrical, ringed.*

#### 7. PRIONODON.

*Prionodon* (subgenus of *Felis*), Horsf. Java, Hodgson.

*Linsang*, Gray, Cat. Mamm. B. M. 48; Müller, Zool. Ind. Arch.

Body very slender; back not crested. Legs short. Tail very long, cylindrical, dark-ringed. Toes 5—5. Claws very acute. Skull elongate. Teeth 38; false grinders  $\frac{3-3}{3-3}$ ; flesh-tooth elongate; tubercular grinders  $\frac{1-1}{2-2}$ .

*Hab.* Asia and Africa.

#### 1. PRIONODON GRACILIS.

B.M.

Fur white; back with broad black cross bands; sides of neck with a broad black streak continued along the sides, confluent with the bands of the back; back of neck with five parallel black streaks. Tail with seven black and white streaks; a second streak, broken into spots, from the side of the neck to the haunches. Legs with small black spots.

*Linsang gracilis*, Müller, Zool. Ind. Arch. i. 28, t.; Gray, Cat. Mamm. B. M. 48; Gerrard, Cat. Ost. B. M. 72.

*Viverra? linsang*, Hardw. Linn. Trans. xiii. 256, t. 24; De Blainv. Ostéogr. t. 12 (teeth).

*Felis (Prionodon) gracilis*, Horsf. Zool. Java, t.

*Viverra hardwickii*, Lesson, Man. 172 (not Gray).

*V. genetta*, Deschamps, MS. B.M.

*Paradoxurus prehensilis*, Schinz, Cuv. Thierr. iv. 349.

*Viverra gracilis*, Desm. Mamm. 539; Schinz, Syn. Mamm. i. 363.

*Paradoxurus linsang*, Fischer, Syn. Mamm. 159, 1829.

*Hab.* Asia: Malacca?, Siam?, Sumatra?, Java? (*Horsfield*).

#### 2. PRIONODON PARDICOLOR.

B.M.

Pale whitish grey; back of neck and shoulders with three streaks, diverging from the vertebral line; back with two series of large square spots; the shoulders, sides, and legs with round black spots; an elongated spot on the middle of the front part of the back, between the square spots on the sides of the body.

*Prionodon pardicolor*, Hodgson, Calcutta Journ. N. H. ii. 37, t. 1. f. 3 & 6, 1841.

*Linsang pardicolor*, Gray, Cat. Mamm. B. M. 49; Gerrard, Cat. Ost. B. M. 72.

*Viverra perdicator*, Schinz, Syn. Mamm. i. 366 (misprint).

*Hab.* Nepal.

The skull elongate; nose rather short, compressed; brain-case narrow in front, swollen over the ears, and contracted and produced behind. Orbits not defined behind, confluent with the temporal cavity; zygomatic arch slender. Palate contracted behind. Teeth 38; upper false grinders compressed; flesh-tooth narrow, much longer than wide in front; the outer edge three-lobed, inner tubercle on the front edge; tubercular grinders transversely trigonal, much wider than long, the outer edge sloped, and the hinder lobes in the middle of the hinder edge. There is no hinder tubercular; but the one present is quite like the front tubercular in the typical Viverridæ.

The skulls of the two species are very similar; but the skull is rather larger, the palate narrower in front and behind, and the bullæ of the ears are narrower and less ventricose in *P. gracilis* than in *P. pardicolor*.

The following are the measurements in inches and twelfths in *P. gracilis*:—length of skull  $1'' 7'''$ ; width at brain-case  $11'''$ ; width of zygomatic arch  $1'' 3\frac{1}{2}'''$ ; length of nose  $9'''$ . *P. pardicolor*:—length of skull  $2'' 6'''$ ; width of brain-case  $10\frac{1}{2}'''$ ; width of zygomatic arch  $1'' 2\frac{1}{2}'''$ ; length of nose  $8\frac{1}{2}'''$ .

#### 8. POIANA.

Head small; ears rounded. Body slender, elongate; fur soft, close, short, nearly uniform in length, spotted; no central dark vertebral line. Legs rather short. Feet hairy, cat-like; toes 5—5, short; hind soles covered with hair; with a short narrow naked line, forked below, and only reaching to the middle of the foot above. Claws retractile. Tail cylindrical, black-ringed.

*Hab.* Africa.

Very like *Prionodon* in external appearance, but with the feet of *Genetta*.

#### POIANA RICHARDSONI.

B.M.

Pale brown, black-spotted; spots on the back larger, square; spots on sides and feet smaller, rounded.

*Linsang richardsoni*, Gerrard, Cat. Ost. B. M. 72.

*Viverra genettoides*, Temm. Esq. Zool. 89, 1853?

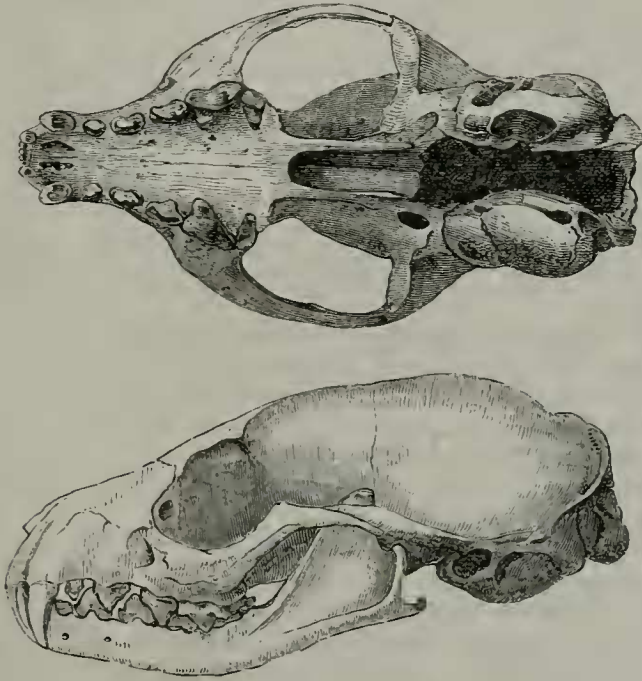
*Genetta richardsoni*, Thompson, Ann. N. H. 1842.

*Genetta poënsis* (jun.), Waterh. P. Z. S. 1838, p. 59.

*Hab.* West Africa: Fernando Po (*Thompson*); Guinea (*Temm.*).

Skull and teeth very like *Prionodon*; but the brain-case is ovate and more ventricose. The orbits not defined behind, and confluent with the temporal cavity; zygomatic arch stronger. The nose is compressed. The palate is very narrow behind. Teeth 38; the

upper false grinders compressed; the flesh-tooth considerably longer than broad in front, with a roundish inner lobe on the front edge, separated from the other lobe by a notch; the tubercular grinders transverse, triangular, broad, with a small lobe in the middle of the hinder edge. There is no second tubercular grinder in the upper jaw. Length of skull 2" 9<sup>'''</sup>, of nose 9<sup>'''</sup>; width of brain-case 1 1<sup>'''</sup>, of zygomatic arch 1" 5<sup>'''</sup>.



*Poiana richardsoni.*

- B. Aberrant Cat-footed Viverridæ. *Subplantigrade*. *The underside of the toes and more or less of the back of the tarsus near the foot bald and callous. The flesh-tooth is massive and strong; the tubercular grinder large, broad.*
1. *Nose produced, convex, and hairy beneath, without any central longitudinal groove. The orbit of the skull only slightly defined above.*

#### Tribe 4. CYNOGALINA.

*The toes short, covered with dense hairs, slightly webbed at the base; the claws short, compressed, retractile; the soles of the hind feet broad, bald for about two-thirds of their length; the heel hairy. The nose rather produced, with a bald muzzle, convex, and hairy beneath, without any central groove. The frenum covered with hair. The fur very dense, close, erect, soft, and elastic. Tail short, cylindrical.*

## 9. CYNOGALE.

*Cynogale*, Gray, Mag. N. H. 1836, i. 579; Proc. Zool. Soc. 1836, p. 86; Cat. Mamm. B. M. 53.

*Lamictis*, De Blainv. Compt. Rend. 1837, 56.

*Potamophilus*, S. Müller, Zool. Ind. Arch. 103, 1839.

Head elongate. Nose broad, swollen; under side hairy, without any central groove. Ears small, rounded, covered with short hairs. Whiskers rigid, elongate, and some longer; more rigid bristles under the ears and over the eyes. Tail much shorter than the body, cylindrical, covered with short hair like that of the body; frenum covered with hair. Teeth 40; false grinders  $3/3$ ,  $3/3$ ; tubercular grinders  $2/2$ ,  $2/2$ .

## CYNOGALE BENNETTII.

B.M.

*Cynogale bennettii*, Gray, Mag. Nat. Hist. i. 579, 1836; Proc. Zool. Soc. 1836, p. 86; Cat. Mamm. B. M. 53; Eydoux & Soul. Voy. Bonite, t.; Gerrard, Cat. Ost. B. M. 78; De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Viverra (Lamictis) carchanas*, Jourdan, Ann. Sci. Nat. viii. 281, t. 8 a, 1837; De Blainv. Ann. Sci. Nat. xiii.

*Potamophilus barbatus*, S. Müller, Zool. Ind. Arch. t. 17.

*Cynogale barbata*, Schinz, Syn. Mamm. i. 388.

*Hab.* Borneo (*Honeywood*).

Skull elongate; face much produced, compressed; orbits not defined at all behind, confluent with the zygomatic cavity; zygomatic arch strong; forehead between the orbits very narrow. Teeth 40; canines compressed; false grinders compressed, third without any inner lobe; flesh-tooth triangular, largely tubercular, nearly as wide as the length of the outer edge—inner lobe very large, rounded internally on the middle of the inner side; tubercular grinders large, rounder on the inner edge, rather wider than the length of the outer edge; the hinder one smaller, but similar to the front one in shape.

Length of the skull  $4'' 9'''$ , of nose  $1'' 10'''$ ; width of brain-case  $1'' 4\frac{1}{2}'''$ , of zygomatic arch  $2'' 2\frac{1}{2}'''$ .

2. *Nose short, flat, with a central longitudinal groove on the lower surface.*

## Tribe 5. GALIDIINA.

*The hind part of the tarsus hairy to the palm; the tail bushy.*

## 10. GALIDIA.

*Galidia*, I. Geoff. Compt. Rendus, 1837, p. 580; Mag. de Zool. 1839, pp. 27 & 38, t. 14, 17.

Ears elongate. Body slender. Legs short. Tail elongate, cylindrical, rather larger at the end, ringed? Toes 5—5, arched, webbed; front subequal; the toes and palm bald; the tarsus hairy behind. Claws acute, compressed, retractile. Skull rather ventricose; face

short; forehead arched; crown flat. Teeth 36 or 38; false grinders 3/3, 3/3, front very small; flesh-tooth triangular, elongate, longer than broad, and falls early; tubercular grinders 2/1, transverse, the second very small (see skull, *G. elegans*, Geoff. *l. c.* t. 17).

We only possess *Galidia elegans*; and the feet of that species have no relation to those of an *Herpestes*, to which M. I. Geoffroy compares them; they are much more those of a Genet, having short, arched, webbed toes and very acute retractile claws.

\* *Tail ringed*; "soles of hind feet narrow." *Galidia*.

### 1. GALIDIA ELEGANS.

B.M.

Dark chestnut-brown; tail nearly as long as the body, black-ringed. Length 15 inches; tail 12 inches.

*Galidia elegans*, I. Geoff. Mag. de Zool. 1839, p. 27, t. 14 & 17; Schinz, Syn. Mamm. i. 378; Gerrard, Cat. Ost. B. M. 76.

*Margusta (Galidia) elegans*, Blainv. Ost. t. 9.

*Genetta?*, A. Smith, S. Afr. Quart. Journ. 52 (see I. Geoff.).

*Vounsira*, Flacourt, Histoire de Madagascar, p. 154, 1661.

*Vausire*, Buffon & Daubenton?

*Hab.* Madagascar (called *Vounsira*).

Skull oblong, rather elongate; forehead shelving, rather convex; the crown flat; the brain-case nearly two-thirds the entire length. False grinders 3/3, the first very small, deciduous, the second and third compressed; the flesh-tooth trigonal, considerably longer than broad at the front edge—the internal tubercle large, and a little behind the front margin. Tubercular grinders—the first subtruncate, oblong, rather wider than long, contracted in the inner side; the second very small, transverse, oblong (see I. Geoff. *l. c.* t. 17).

In the figure cited the brain-cavity is nearly three-fifths the entire length of the skull (that is, measured to the back of the orbits); and the zygomatic arch is rather wider than half the length of the skull.

\*\* *Tail one colour*; "soles of hind feet more bald." *Salanoia*.

### 2. GALIDIA CONCOLOR.

Red brown, black-dotted; tail like back, much shorter than the body; ears broad and short. Length 13 inches; tail 7 inches.

*Galidia concolor*, I. Geoff. Mag. Zool. 1839, p. 30, t. 15; Coquerel, Mag. de Zool. xi. 465; Schinz, Syn. Mamm. i. 377.

*G. unicolor*, I. Geoff. Compt. Rend. Acad. Sci. 1837, v. 581.

*Hab.* Madagascar.

### 3. GALIDIA OLIVACEA.

Olive-brown, yellow-dotted; tail same colour as the body; false grinders 3/2; tubercular grinders broader than in *G. elegans*, especially the hinder ones.

*Galidia olivacea*, I. Geoff. Mag. de Zool. 1839, t. 16; Schinz, Syn. Mamm. i. 378.

*Hab.* Madagascar (*Bernier*) (called "Salano").

? *La petite fouine de Madagascar*, Sganzin in Rev. et Mag. de Zool. 1855, p. 41.

#### Tribe 6. HEMIGALINA.

*The toes and the middle of the lower part of the tarsus bald; the upper part and sides of lower part hairy. Tail ringed. Fur soft. Frenum hairy. Orbit imperfect.*

#### 11. HEMIGALEA.

*Hemigulea (Hemigalus)*, Jourdan, Compt. Rend. 1837; Ann. Sci. Nat. viii. 276, 1837 (not characterized).

Head conical. Nose bald, flat, and with a distinct central groove below; nostrils lateral. Ears moderate, ovate, covered with hair externally. Whiskers numerous, very long, rather rigid, with tufts of slender bristles on the throat, cheeks, and eyebrows. Toes 5—5. Claws acute, semiretractile. Hind feet semiplantigrade; the upper part of the sole hairy, with a narrow bald sole in front below. Frenum covered with hair. Teeth 40; false grinders 3/4, 3/4; tubercular grinders 2/1, 2/1.

The genus is only very indistinctly characterized by M. Jourdan in the papers referred to.

#### HEMIGALEA HARDWICKII.

B.M.

Pale yellow; three streaks on the head, two streaks on the nape, some marks on the ears, five crescent-like bands across the back, two rings on the base of the tail, and the end of the tail black.

*Viverra hardwickii*, Gray, Spic. Zool. ii. 9, t. 1 (not Lesson).

*Hylogale zebré*, Voyage de la Bonite, t.

*Viverra loiéi*, S. Müller, Zool. Ind. Arch. t. 18; Schinz, Syn. Mamm. i. 363.

*Hemigale zebré*, Jourdan, Ann. Sci. Nat. viii. 277.

*Paradoxurus derbianus*, Gray, Loudon's Mag. N. H. i. (1837) p. 579; Proc. Zool. Soc. 1837, p. 67; De Blainv. Ost. Atlas, t. 7, t. 12 (teeth).

*P. ? zebra*, Gray, Loudon's Mag. N. H. i. (1837) p. 579 (from a drawing).

*P. philippensis* (partly), Schinz, Syn. Mamm. i. 387.

*Hab.* Malacca (*Major Farquhar*); Borneo (*Lowe*).

The skull agrees with *Genetta* and *Nandinia* in the hinder opening of the palate being only a short distance behind the line between the back edges of the hinder tubercular grinders. The orbit is very incomplete. The teeth are short, broad, and very unlike those of *Genetta* and *Nandinia*—somewhat similar to those of the genus *Paguma*. The first and second false grinders are compressed, the third has an inner lobe on the middle of the inner side. The flesh-tooth is triangular, scarcely longer than the width of the middle of the tooth, the large inner lobe occupies nearly the whole inner



side. The tubercular grinders are oblong, triangular, much wider than long, rounded on the inner side; the hinder one like the front, but only about half the size. The nose of the skull is elongate. The brain-cavity ovate, ventricose, not suddenly constricted in front. Forehead shelving, rather convex. The bullæ of the ears are oblong, elongate, vesicular, truncated behind, and keeled on the outer edge. Length of the skull 3'' 9''', of nose 1'' 4½''', of zygomatic arch and orbit 1'' 6'''; width of brain-case 1'' 3''', of back of mouth 6'' 1½''', of zygoma 1'' 10'''.

#### Tribe 7. ARCTICTIDINA.

*The hinder part of the tarsus bald and callous. The tail thick, strong, and prehensile. Fur harsh, bristly. Ears pencilled. Frenum hairy. Orbit of skull imperfect, only defined by a prominence above.*

#### 12. ARCTICTIS.

*Arctictis*, Temm. Monogr. xx. 21, 1820?

*Ictides*, F. Cuvier; Valenciennes, Ann. des Sci. Nat. iv. 57, 1825; Férus. Bull. Sci. v. 266, 1825.

Head conical. Whiskers numerous, long, rigid, more slender on the cheeks, throat, and eyebrows. Nose acute; underside flat, with a broad central groove. Eyes small. Ears closely covered with long hairs, forming a pencil. Toes 5—5. Claws compressed, acute, retractile. Soles of hind feet broad, entirely bald and callous to the heel. Tail conical, covered with long hair, convolute. Frenum covered with hair? Teeth 36; false grinders 2/3, 2/3; tubercular grinders 2/1, 2/1.

#### ARCTICTIS BINTURONG.

B.M.

Black. Younger with more or less long white tips to the hairs; young, pale dirty yellow.

*Viverra ? binturong*, Raffles, Linn. Trans. xii. 253.

*Arctictis binturong*, Temm. Monogr. ii. 308; Fischer, Syn. Mamm. i. 157; Gray, List Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 78; Cantor, Cat. Malay. 54; Horsfield, Cat. India House Mus. 94.

*A. penicillatus*, Temm. Monogr. ii. t. 62; Müller, Zool. Ind. Arch. 32.

*Paradoxurus albifrons*, F. Cuvier, Mém. Mus. ix. 44, t. 4; Mamm. Lithogr. t.

*Ictides*, F. Cuv. Dents Mamm. 104, t. 34.

*Ictides ater*, F. Cuvier, Mamm. Lithogr. t.

*I. albifrons*, Valenc. Ann. Sci. Nat. iv. 57, t. 1; F. Cuvier, Mém. Mus. ix. t. 4.

*Hab.* Malacca (*Farquhar*, 1819); Sumatra (*Raffles*); Java (*Temminck*); Tenasserim and Arracan (*Cantor*); Assam, Nepal (*Blyth*).

Varies in the quantity and length of white tips of the hairs.

Major Farquhar says, "It climbs trees, assisted by its prehensile

tail, in which it has uncommon strength." M. F. Cuvier (Mém. Mus. ix. 46) doubts this fact; but he is wrong, as any one may see by observing the living animal in the Zoological Gardens.

Skull of young animal elongate. Teeth 36; canines slender; grinders small and far apart; the false grinders, first and second conical, the third compressed; the flesh-tooth small, triangular, inner side rounded; tubercular grinder oblong, trigonal, with a rounded inner edge, larger than the flesh-tooth. Length of skull 4" 6"', of nose 1" 6"'; width of brain-case 1" 7"', of zygomatic arch 2" 4"'.

In the adult skull, false grinders 3/, 3/, compressed, the third triangular; the flesh-tooth triangular, as broad as long, inner edge rounded, with the inner tubercle in the middle; the tubercular grinders small, the first triangular, somewhat like the flesh-tooth, but smaller, the hinder very small, cylindrical (*Temm. Monogr.* ii. t. 50).

The skeleton agrees with *Paradoxurus* in the large number (34) of caudal vertebræ, but differs from it in having a more plantigrade character in the bones of the feet (*Temm. Monogr.* ii. 307).

M. Temminck (*Monogr.* ii. 308) proposed to arrange *P. aureus* of F. Cuvier with this genus, as it could not be classed with any other group, observing that it is described from a very young specimen not more than one or two months old; and he objects to species being described on such specimens.

#### Tribe 8. PARADOXURINA.

*The hind part of the tarsus bald and callous. The tail cylindrical, hairy, very long, of many vertebræ, revolute. The frenum with a secretory gland. Head elongate. Orbit of skull generally only defined by a slight prominence above. Pupil linear, erect.*

This is an exceedingly natural group, well defined by its external characters and general appearance; at the same time the form of the skull and the teeth of the different species present so great an amount of variation that, if one studied the skull only, one would be inclined to distribute them among several different tribes of Carnivora—an instance, among many, which shows the necessity of studying the animal as a whole, and of not devoting one's attention more to the osteological than the external characters, or *vice versâ*.

The gland on the frenum, which is the peculiar character of the genus, was known to Pallas, who called the species *Viverra hermaproditæ* on account of it. It was redescribed and figured by Otto, but overlooked by F. Cuvier when he named the genus from a specimen with a distorted tail!

"M. Temminck observes, "Nom générique donné à tout hasard par F. Cuvier, dont il faut se garder de ne rendre l'application strictement applicable à aucune des espèces de ce groupe."

"La forme et le pouvoir que M. F. Cuvier attribue à cette queue sont basés sur des observations faites sur un sujet soumis à l'état captif, mais ne sont nullement caractérisés pas moins spécifiquement pour son *Pougonne*, notre *Paradoxurus typus*—la Marte des Palmiers du Buffon."—*Mon. Mamm.* ii. 312.

If M. Temminck had observed many of these animals alive, he would have found that many of them have the habit of curling up the end of the tail as it lies on the ground, and that the ends of the tails of those in confinement are often worn away on the side from this habit (see also Bennett, P. Z. S. 1835, p. 118).

M. Temminck describes the claws as "not retractile" (Monogr. ii. p. 312); but Mr. Turner, in his interesting observations on the anatomy of *Paradoxurus typus*, describing the feline habit of the animal, states that the claws are quite as retractile, and scale off at the ends to keep them sharp, as in the Cat; he also says the preputial gland secretes the odorous exhalation (see Proc. Zool. Soc. 1849, p. 24).

"The *Paradoxuri* are in habits like the Civets; their glandular secretion is peculiar, not civet- or musk-like."—Cantor, *Cat.* 32.

Tail very long; caudal vertebræ 36 or 38.

The species of this group have been very imperfectly understood. In the 'Proceedings of the Zoological Society' for 1832 I gave a monograph of the species which the specimens and other materials then available afforded; and I revised the species in the 'Magazine of Natural History' for 1837. The number of species described being so much larger than was then known on the Continent, seems to have excited the distrust of the Continental zoologists as to their distinctness.

M. Temminck, in the second volume of his 'Monographie,' published an essay on the genus, and states that he was indebted to Mr. Ogilby for his assistance. But I fear he must have misunderstood some of Mr. Ogilby's observations; for I can hardly think that an English zoologist, who, from his position as Secretary of the Zoological Society, must have seen many species of the genus alive, could have had such an imperfect acquaintance with the specimens that are to be seen in our menageries.

M. Temminck's 'Monograph' is accurate as far as regards the species which inhabit the Asiatic possessions now or formerly under the Dutch rule. But M. Temminck seems to be entirely unacquainted with the species of continental India and China; he confused, under the same description, species that are very unlike in external characters: some of his figures of the skull do not agree with the skulls of the species which we have extracted from the skins. I may observe that it was formerly the great defect of the osteological collection at Leyden that many of the skeletons had been purchased at sales of private collections in London and elsewhere; so that the accuracy of the determination of the species from which the skulls were obtained solely depended on the accuracy or knowledge of the proprietor, generally more of an anatomist than a zoologist; and as the skin was not kept, there was no means of verifying the name. Hence it is very likely the Nepal *P. grayi* was called in the collection from which it was obtained *P. musanga* of Java. M. Schlegel has been remedying this defect by the preparation of skeletons from well-determined specimens.

M. Jourdan observes, "Ce que nous pouvons dire c'est que dans la collection ostéologique du Muséum il existe des têtes osseuses qui,

sous le nom commun de *Paradoxurus typus*, indiquent au moins quatre espèces, et que dans chaque une d'elles on peut aisément distinguer un degré tranchant et différent de disposition carnassière."—*Ann. Sci. Nat.* viii. 275, 1837.

The development of the auditory bulla is variable in the genera and species. In *Paguma*, *Paradoxurus*, and *Arctogale* the bulla is large, ventricose, slightly keeled along the lower edge, with a triangular end. In *Nandinia* it is very small, not inflated, and scarcely raised. It varies in form in the different species of *Paradoxurus*, being smallest in *P. bondar*.

The hinder part of the palate of the skull also affords good characters, thus:—

1. The hinder opening of the palate is wide, and nearly in a line with the hinder edge of the last grinder, in *Paradoxurus* and *Nandinia*.

2. The hinder opening of the palate is wide, and further back than the hinder edge of the last grinder, in *Paguma* and *Arctictis*.

3. The hinder opening of the palate is narrow, at the end of a narrow depressed tube, and considerably further back than the hinder edge of the last grinder, in *Arctogale*.

The specimens which are in the British Museum Collection may be divided and arranged thus, from what has been called the "most carnivorous" to the "most omnivorous" form of teeth.

1. The flesh-tooth very narrow, with a small internal process on the front edge. *Nandinia binotata*.
2. The flesh-tooth rather narrow, with a rather small internal lobe on the front edge. *Paradoxurus bondar*.
3. The flesh-tooth rather wider, with a moderate-sized internal lobe on the front edge; teeth moderate. *P. crossii*, *P. nigrifrons*, and *P. zeylanicus*.
4. The flesh-tooth triangular, broad, massive, with a large internal lobe occupying a great part of the inner side.

a. The teeth elongate, large, massive. *Paradoxurus musanga*, *P. philippensis*, *P. macrodus*, and *Paguma leucomystax*.

b. The teeth shorter and broader, moderate or small. *Paguma grayi*, *P. larvata*, and *Arctogale trivirgata*.

They may be arranged, according to the form of the adult skull, thus:—

1. The brain-case wide in front, scarcely constricted. Orbit indistinctly marked. Nose broad. *Paguma larvata* and *P. leucomystax*.
2. The brain-case wide in front, and distinctly constricted. Nose rather elongate.

- a. Orbit marked only with a short blunt process on the upper hinder edge. *Paguma grayi*.
- b. Orbit marked with a rather short, acute, well-marked process on the upper hinder edge. *Nandinia binotata*.
3. The brain-case narrow, and evidently and distinctly constricted in front. The orbit undefined.
- a. The face broad; width at the tubercular grinder about four-fifths the length of the palate. *Paradoxurus philippensis*, *P. crossii*, *P. nigrifrons*, *P. fasciatus*, and *P. macrodus*.
- b. The face rather elongate; width at the tubercular grinder two-thirds of the length of the palate. *P. zeylanicus*, *P. bondar*, and *P. hermaphroditus*.
4. The brain-case narrow, suddenly and distinctly constricted in front. The orbit well defined behind. *Arctogale trivirgata*.

The following table may facilitate the determination of the species in the Museum from their external appearance:—

- I. *Fur thick, very hairy, rigid, not striped, without any spots under the eyes.* *Paguma leucomystax*.
- II. *Fur very thick, long, with longer rigid hairs, not striped or spotted, but with a spot under the eye.* *Paguma grayi*, *Paradoxurus bondar*.
- III. *Fur thick, soft, with longer rigid hairs, with a spot under the eye.* *Paradoxurus hermaphroditus*.
- IV. *Fur very thick, close, soft, of nearly uniform length, with a spot under the eyes; cheek whitish, with small dark spots.* *Paradoxurus crossii*, *Paguma larvata*, *Paradoxurus philippensis*, *P. nigrifrons*, *P. musanga*, and *P. dubius* (*cheek dark*).
- V. *Fur soft; back striped; with no spots under the eyes or on the face.* *Arctogale trivirgata*.
- VI. *Fur soft, thick, close; back spotted; with two yellow spots on the shoulder.* *Nandinia binotata*.
- VII. *Fur very soft, of a uniform colour, with no spot under the eye or on the face.* *Paradoxurus zeylanicus*.

### 13. NANDINIA, Gray.

Nose conical; underside flat, with a distinct central groove. Frenum covered with hair (?). Nose of skull compressed, produced. The brain-case rather constricted in front behind the orbit. The orbit incomplete, with a well-marked acute process from the

forehead, and none from the zygomatic arch behind. The forehead flat, rhombic; produced, angular behind the orbit. Palate wide behind. Teeth 40; false grinders  $3/4$ ,  $3/4$ ; flesh-tooth elongate, narrow, with a small internal lobe on the front edge; the hinder tubercular very small, circular.

The skull is figured by De Blainville (Ostéogr., Viverra, t. 6) as that of *Paradoxurus? hamiltonii*.

#### NANDINIA BINOTATA.

Nape with three black parallel streaks, one from the forehead, the other from the ears. Back with numerous black spots. Withers each with a yellow spot. Lips, throat, and beneath rufous grey. Legs grizzled, not spotted. Tail elongate, tapering, with many narrow black rings; end blackish. Length 23 inches; tail 19 inches.

*Nandinia binotata*, Gray, Cat. Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 80.

*Viverra binotata*, Reinwardt, MS.; Gray, Spic. Zool. 9; Smith, S. African Quart. Journ. ii. 134.

*Paradoxurus hamiltonii*, Gray, Proc. Zool. Soc. 1832, p. 67; Illust. Ind. Zool. t.; Temm. Monogr. ii. 336, t. 65. f. 1.

*Paradoxurus? binotatus*, Gray, P. Z. S. 1832, p. 68.

*P. binotatus*, Temm. Monogr. ii. 336, t. 65. f. 7-9 (skull); Esq. Zool. 119, 120.

*Hab.* West Africa: Fernando Po (*Cross*); Ashantee (*Mus. Leyden.*); Guinea (*Mus. Leyden.*).

Varies in the brightness and rufous tint of the fur, and also in the size of the spots; in some they are much larger, and apparently fewer, than in others.

Orbit of skull not defined behind, confluent with the zygomatic cavity. Upper false grinders 3, compressed, first small, third without any distinct inner lobes; flesh-tooth elongate, outer edge considerably longer than the width of the front edge, inner tubercle on the front edge; tubercular grinders two, front triangular, rather wider than the length of the outer edge, hinder small, circular. Length of skull  $3'' 4'''$ , of nose  $1'' 1'''$ ; width of brain-case  $1'' 2\frac{1}{2}'''$ , of zygoma  $1'' 10'''$ .

#### 14. PARADOXURUS.

*Paradoxurus*, F. Cuv. Mamm. Lithogr. ii. t., 1821.

*Platyschista*, Otto, Nov. Act. Acad. Leop. xvii. 1090, 1835.

*Viverra hermaphrodita*, Pallas.

Head conical. Nose flat, and with a central groove beneath. Whiskers numerous, strong, elongate. Toes 5—5. Frenum bald, glandular. The skull with the brain-case strongly and suddenly constricted in front; forehead small, transverse, truncated behind. The orbit very incomplete, with only a short conical prominence above behind, and none on the zygomatic arch below; hinder part of the palate moderate, with only a very slight notch at each side on

its front edge, Teeth 40, large; false grinders,  $\frac{3-3}{3-2}$ ; the flesh-tooth triangular or subelongate; the tubercular oblong, transverse.

M. Temminck, in his 'Monographies de Mammalogie,' vol.ii. p.312 (published in 1855), has given a monograph of this genus; the synonyms are very incorrect.

\* *The skull elongate; the nose slender; the width of the head at the last tooth two-thirds the length of the palate; the flesh-tooth elongate, rather narrow, with a small internal lobe on the front edge.* Bondar.

### 1. PARADOXURUS BONDAR.

Fur very long, hairy, rather rigid, dirty yellowish white varied with the long black tips of the longer and more rigid hairs; end of nose brown, generally with a white central streak. The feet, outer side of fore legs, and end of the tail blackish.

*Ichneumon bondar*, Buchanan, MS.

*Viverra bondar*, De Blainville, Journ. de Phys.; Fischer, Syn. Mamm. 172.

*Paguma bondar*, Horsfield, Cat. Mus. E. Ind. Comp. 68.

*Paradoxurus bondar*, Gray, P. Z. S. 1832, p. 66; Illust. Ind. Zool. t.; Temm. Esq. Zool. 120; Gerrard, Cat. Osteol. B. M. 79; Schinz, Syn. Mamm. i. 385.

*Par. pennantii*, Gray, P. Z. S. 1832, p. 66; Illust. Ind. Zool. t.

*Par. hirsutus*, Hodgson, Asiatic Researches, xix. 72, 1836.

*Genetta bondar*, Lesson, Mamm. 175.

*Hab.* Nepal; North Behar and Tarai (*Hodgson*).

This species is easily known from *P. grayi* by the rigid harshness of the fur and the dark colour of the outside of the legs.

Skull narrow, elongate. False grinders distant, the third trigonal; flesh-tooth narrow, elongate, the outer edge longer than the width of the front edge, with the inner lobe on the front margin; tubercular grinder oblong, transverse, rather narrower and rounded on the inner side, wider than long; the hinder tubercular small, oblong, subcircular. Length of skull 4" 1½", of nose 1" 5"; width of brain-case 1" 4½", of zygoma 2" 3".

\*\* *The skull moderately broad; the width of the head at the last tooth about four-fifths of the length of the palate; the flesh-tooth rather longer than wide in front, with a moderate-sized internal lobe on the front edge.* Platyschista.

### 2. PARADOXURUS ZEYLANICUS.

B.M.

Nearly uniform brown or dark brown; the longer hairs with a bright golden tint; ears nearly naked; whiskers pale brown; tail subcylindrical, sometimes with a single yellow or pale subterminal band; heel of hind feet hairy. Length of body and head 21 inches, tail 17 inches.

*Paradoxurus zeylanicus*, Gray, Cat. Mamm. B. M. 55 ; Gerrard, Cat. Osteol. B. M. 79 ; Kelaart, Fauna Zeyl.

*Viverra zeylanica*, Pallas in Schreb. Säugeth. 45 ; Fischer, Syn. Mamm. 172.

*V. ceylonensis*, Bodd.

? *Paradoxurus aureus*, Desm. Mamm. 540 ; F. Cuvier, Mém. Mus. ix. 47, t. 4 ; Gerrard, Cat. Osteol. B. M. 79.

*P. typicus*, De Blainv. Ostéogr. Viverra, t. 12 (teeth), t. 7 (skull).

? *Arctictis aureus*, Fischer, Syn. Mamm. 158.

*Hab.* Ceylon (*Pallas, Kelaart*).

These animals differ in the intensity of the colour of the fur : some are bright golden, and others much more brown ; the latter is *P. fuscus* of Kelaart. One of our specimens has a bright yellow ring near the tip of the tail.

Third upper false grinders with only a slight indication of a lobe in the middle of the inner edge ; the flesh-tooth with the outer edge scarcely longer than the width of the front edge ; first tubercular large (with the inner edge narrower than the outer one), larger than in *P. philippensis*.

The figure of the skull and of the teeth of the skull named *Paradoxurus typicus* in De Blainville's 'Ostéographie,' tt. 7 & 12, exactly represents the skull and teeth of our *Paradoxurus aureus* received in the skin from Ceylon.

Dr. Kelaart has described, and we have in the British Museum, two varieties of *P. zeylanicus* differing in the intensity of the colour of the fur. In the British Museum we have three skulls, with their permanent teeth, said to have been sent from Ceylon, one being from the skin in the collection sent by Dr. Kelaart : one is larger and rather broader than the other two, which are younger. In two of them the flesh-teeth are nearly similar, with a moderate-sized internal lobe, and the first and hinder upper tubercular grinders are much larger in one of these than in the other. In the third skull, which is the larger, the internal lobe of the flesh-tooth is much longer, compared with the size of the outer portion, than in the preceding skulls ; and the first tubercular grinder is much larger, longer, and more massive compared with its width than in either of the preceding ; in this skull the hinder tubercular is yet not developed.

Is it that these skulls belong to, and are characteristic of, the two animals which we have thus wrongly called varieties ? or does the difference merely arise from their being of two sexes ? Genera have been formed on less differences in the Carnivora.

### 3. PARADOXURUS HERMAPHRODITUS.

B.M.

Fur long, rigid, harsh, blackish more or less varied with the pale colours of the lower part of the hairs, scarcely showing three indistinct black streaks on the back ; under fur thick, soft, and very pale reddish ; the feet and end of the tail black ; spot under the eye and the forehead paler, more or less grey or whitish.

*Viverra hermaphrodita*, Pallas, Schreb. Säugeth. 426.



*Paradoxurus hermaphrodita*, Gray, P. Z. S. 1832, p. 69.

*Platyschista pallasii*, Otto, N. Act. Leop. xvii. 1089, t. 71, 72.

*Viverra nigra*, Desm. Mamm. 208, from Buffon, Suppl. iii. t. 47.

*La Marte des Palmiers, ou le Pougonne*, F. Cuv. Mamm. Lithogr.

*Paradoxurus typus*, F. Cuv. Mamm. Lithogr.; Fischer, Syn. Mamm. 158; Temm. Monogr. ii. 215; Esq. Zool. 126; Ogilby, Zool. Journ. iv. 303; Horsfield, Cat. India House Mus. 60; Gerrard, Cat. Osteol. B. M. 80; Schinz, Syn. Mamm. i. 384.

*Genette de France*, Buffon, H. N. vii. 58; Suppl. iii. t. 47.

*Musk or Musky Weasel*, Penn. Quadr.

*Hab.* Continental India, in the plains: Bengal (*Temm.*); Madras (*Jerdon*).

This species differs from the preceding in being small and much blacker. Only one of the wild specimens in the Museum, in a good state of fur, shows any indication of the three black dorsal streaks; but the fur can easily be placed so as to make three more or less interrupted ones apparent: and some of the specimens, which have the tips of the longer hairs worn off, have a somewhat striped appearance on the back; but this is evidently only depending on the bad state of the specimens from their having been kept in confinement.

The skull is very like that of *P. zeylanicus*; the teeth are rather larger; the nose rather narrower in front; the flesh-tooth is rather broad and thick; the front tubercular grinder is transverse, narrower on the inner side, and contracted in front and behind in the middle; the hinder tubercular is very small and circular; the palate-edge is arched behind. The skull is very old, and the orbit is rather more defined behind than usual.

The *Viverra hermaphrodita* of Pallas is thus described:—"Ashy black hairs, grey at the base, black at the tip; beneath pale, a white spot under the eye; ears, throat, and feet black; nose, whiskers, and back with three black streaks; tail longer than the body, black at the tip; claws yellow. Most probably this species is also the *Platyschista pallasii* of Otto; but his figure makes the stripes on the back more distinct than they are usually seen, and the sides of the body too spotted; but it is easy to make a specimen look like the figure.

The figure of the teeth of *P. typus*, in De Blainville's 'Ostéographie,' better represents the teeth of our *P. zeylanicus* than of *P. typus*. Perhaps it is not from the skeleton found on plate 2, which is said to be the animal described by F. Cuvier. The chief difference between the skulls of the two species is, that the internal lobe of the flesh-tooth in *P. zeylanicus* is in a straight line with the front edge of the tooth, whereas in *P. typus* it is rather in front of the outer part of the front edge of the tooth.

The skeleton of the animal first described by F. Cuvier as *Paradoxurus typus* is engraved by De Blainville, Ostéogr. t. 2.

#### 4. PARADOXURUS CROSSII.

B.M.

Fur short and close, erect, pale iron-grey without any spots or stripes, spot on side of nose, under orbit, forehead, and base of ears whitish; nose dark brown; feet and ends of the tail black.

*Paradoxurus crossii*, Gray, Proc. Zool. Soc. ii. 67, 1832; Illust. Ind. Zool. ii. t. 7.

*P. musanga*, var., Temm. Esq. Zool. 120.

*Paguma crossii*, Gray, Cat. Mamm. B. M. 54; Gerrard, Cat. Osteol. B. M. 79.

*Hab.* India (*Brit. Mus.*).

Described from an adult specimen that was confined in the Surrey Zoological Gardens. It is very like *P. grayi*; but the fur is short, thick, and very close, and the colouring of the face is rather different. The nose is brown in the centre, with the brown colour extending under the eyes; the spot under the eye is small and indistinct.

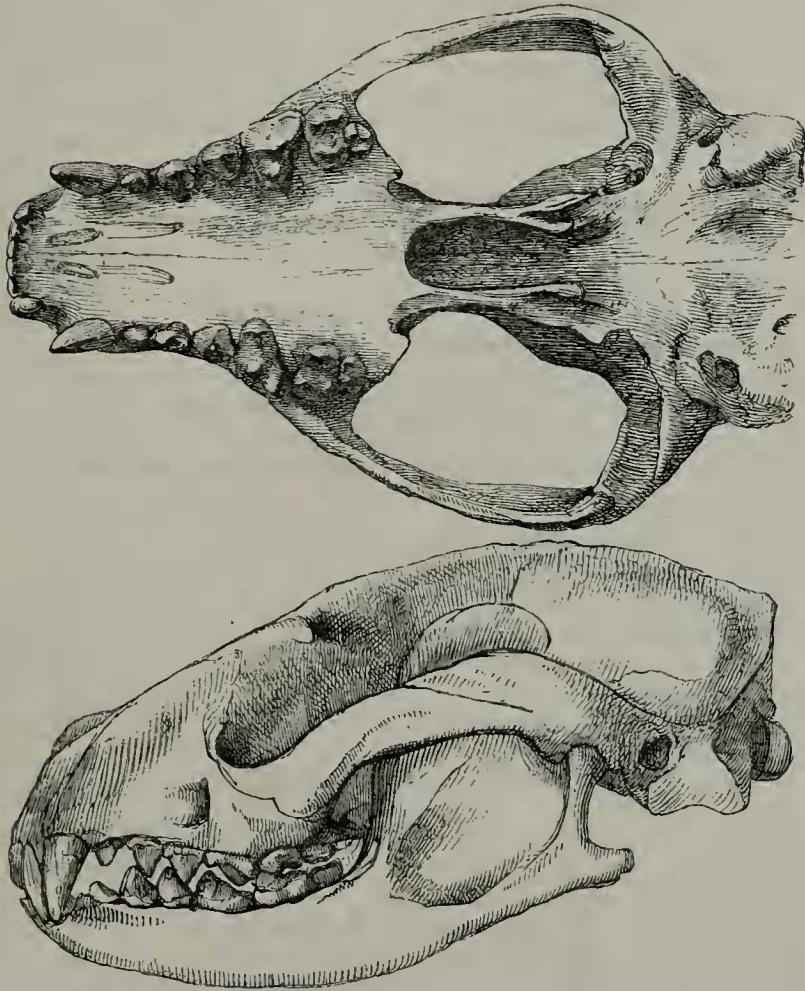
The skulls of the type specimens of *P. crossii* and *P. nigrifrons* in the British Museum are very much alike in general shape, in the breadth of the palate compared with the length, and in the form of the grinders, including the flesh-tooth. Considering the variations which individuals of the same species present, if we had had only the skulls, not knowing the characters of the fur and the colours of the two species, we might have considered them to be varieties of the same species. But knowing that they are the skulls of two very distinct species, one can perceive that the nasal bones are much longer, and the condyles of the skull larger and more oblique, in *P. crossii* than the same parts in the skull of *P. nigrifrons*. The bulla of the ears is differently shaped, ending below in small acute-keeled prominences in *P. crossii*, while in *P. nigrifrons* the whole outer hinder edge is strongly keeled. *P. crossii* is rather narrower at the zygoma. These differences might be peculiar to the individual in each case; and I should not have considered them of specific importance, if I had not known the external characters and appearance of the animals.

The measurements of the two skulls are as follows, in inches and twelfths:—

	<i>P. crossii.</i>	<i>P. nigrifrons.</i>
Length of skull . . . . .	3" 9'''	3" 10 $\frac{1}{2}$ '''
— of nose . . . . .	1 3	1 3
— of palate . . . . .	1 9	1 9
Width of last grinders . . . . .	1 3 $\frac{1}{2}$	1 4
— of brain-case . . . . .	1 3	1 3
— of zygoma . . . . .	2 4 $\frac{1}{2}$	2 1 $\frac{1}{2}$

M. Temminck refers *Paradoxurus crossii* to *P. musanga*, and observes that "it is established on the same specimens as served as the model for the figure of Horsfield." How he could have made such an extraordinary mistake I cannot conceive. *P. crossii* was described from a specimen living in the Surrey Zoological Gardens, which did not arrive in this country until several years after Dr. Horsfield's work was published; and Dr. Horsfield's figure was drawn from a stuffed specimen collected by himself in Java, and for years exhibited in the Museum at the India House; while the type specimen of *P. crossii* was, and is still, in the collection of the British Museum. I feel that little reliance can be placed on M. Temminck's statements as to his observations on type specimens. Probably in

this case he was misled by misunderstanding some observations of Mr. Ogilby.



Skull of *Paradoxurus crossii*.

5. PARADOXURUS NIGRIFRONS.

B.M.

Fur short, close, blackish grey varied with the black tips to the longer hairs; nose, crown, cheeks, and upper part of the throat and feet reddish black; tail-end black; a whitish spot on side of nose, under, and above the eyes; a streak at the base of the ears, and the sides of the throat behind the dark cheeks, whitish.

*Paradoxurus nigrifrons*, Gray, Cat. Mamm. B. M. 55; Illustr. Ind. Zool. t.; Gerrard, Cat. Osteol. B. M. 79.

*Hab.* India (*Brit. Mus.*). Single specimen.

The specimen is very like *P. crossii* in the nature and colour of

the fur; but it is rather darker in every part, and the crown and cheeks are reddish black, being in *P. crossii* grey or whitish.

In the blackness of the cheeks and throat and the paleness of the forehead this species is allied to *P. musanga*; but the fur is shorter, and I cannot find any indications of dorsal streaks or spots, and the whiteness of the forehead is much more indistinct and diffused than in any specimens of that species I have seen. The specimen has been in confinement; but its fur is in very good condition.

\*\*\* *The skull broad; the width of the head at the last tooth about two-thirds of the length of the palate; the flesh-tooth broad, massive, triangular, with a large internal lobe occupying two-thirds of the inner side. Macrodon.*

#### 6. PARADOXURUS FASCIATUS.

Fur short, close, blackish grey; back with five longitudinal black streaks, more or less broken, especially the side ones, into spots; sides, shoulders, and thighs with small spots; face, occiput, chin, throat, and end of tail black; forehead, spot on side of nose, and under orbit white.

*Viverra fasciata*, Desm. Mamm. 209.

*Genetta fasciata*, Lesson, Mamm. 174.

*V. geoffroyii*, Fischer, Syn. Mamm. 171.

*Paradoxurus musanga*, Gray, P. Z. S. 1832, p. 16.

*P. musanga*, var. *javanica*, Horsf. Java, t.; Temm. Monogr. ii. 317, t. 53. f. 2-5, t. 54. f. 1, 2, 3 (skulls); Esquis. Zool. 120; Horsf. Cat. India House Mus. 62; Gerrard, Cat. Osteol. B. M. 80; Schinz, Syn. Mamm. i. 382.

*Viverra musanga*, Raffles, Linn. Trans. xiii. 255.

*Musang*, Marsden, Sumatra, 110, t. 12.

*Paradoxurus typus*, var. *sumatranus*, Fischer, Syn. Mamm. 159.

*P. setosus*, Homb. & Jacq. Voy. de l'Astr. Zool. iii. 25, t.

Var. Forehead more white:—

? *Paradoxurus pallasii*, Gray, P. Z. S. 1832, p. 67; Illust. Ind. Zool. t.; Horsfield, Cat. India House Mus. 63.

? *P. albifrons*, Benuett, in Zool. Gardens List (not of Cuvier).

Var. Tip of tail white.

*Hab.* Malacca, Java, Sumatra, Borneo (*Horsfield*).

M. Temminck confounds *Paradoxurus crossii* and *P. pallasii* with this species (see Esquis. Zool. 220).

The size of the spots on the face and the extent and pureness of the white on the forehead vary; but the animal always has a distinct brown or black mark on the back of the cheeks, most distinctly defined on the lower part of the face. The species has been divided into several on account of these differences.

A specimen from Borneo in the Museum is so black that the spots are scarcely to be distinguished; but there are specimens in the collection that are intermediate between it and those which have the common colour of the species.

The skull is like that of *P. nigrifrons*; the teeth are much more thick and massive; the flesh-tooth broader, and with a much larger internal lobe; the first tubercular is more square, nearly as wide on the inner as on the outer side; the hinder tubercular is small, subcircular; the palate has an angular notch behind; the zygomatic arch is also a little wider.

The length of the skull 4", of the nose 1" 4"', of palate 1" 10½"', width at tubercular grinder 1" 6"', at zygoma 2" 3"', of brain-case 1" 5'''.

*Paradoxurus quinquelineatus* and *Paradoxurus musangoides*, Gray, Loudon's Mag. N. H. i. 579, 1837, are perhaps only varieties of the young animal of this species.

*Viverra fasciata*, Desm. Mamm. 209 (not of Gmelin), described as pale yellow, with longitudinal series of brown spots, end of the nose and frontal cross band white, is also probably the same. It cannot be *Viverricula madagascariensis*, as the forehead is not particularly white. This is perhaps the *Platyschista* ——? which Otto notices in 'Nova Acta Acad. Leop. Carol.' xvii. 1102.

*Hab.* Java? (*Mus. Paris.*).

#### 7. PARADOXURUS DUBIUS.

B. M., type.

Pale yellowish ashy brown, with three indistinct, rather interrupted, darker bands and some indistinct darker spots on the sides; head, ears, and feet chestnut; forehead with an indistinct whitish band; spot on side of nose and under eyes white.

*Paradoxurus dubius*, Gray, P. Z. S. 1832, p. 66; Cat. M. B. M. 56.

*Hab.* Java (*Brit. Mus.*).

The skull is in the skin; so I have not been able to examine it. This species may be only a very pale variety of *P. fasciatus*.

#### 8. PARADOXURUS PHILIPPENSIS.

B. M., type.

Fur blackish, with a silvery gloss; spot under eyes distinct; cheeks dark brown; head, feet, and the greater part of the tail blacker; the back with three indistinct narrow black streaks, which converge near the rump, and with a series of very indistinct small ones on the upper part of the sides; sides of forehead, chest, and beneath whiter; whiskers white and black; ears hairy.

Var. Dorsal stripes none. B. M.

Var. Albino, yellowish white. B. M.

*P. aureus*, Waterhouse, Cat. Zool. Soc.

*Martes philippensis*, Camellus, Phil. Trans. xxv. 2204.

*Paradoxurus zeylanicus* (partly), Gray, Cat. Mamm. B. M. 55.

*P. philippensis*, Temm. Monogr. ii., Esq. Z. 120 (not Jourdan).

*Hab.* Manilla, Philippines: Casmiguind (*Cuming*).

The colours vary much in intensity, and in the lighter and darker specimens the spots and streaks are scarcely visible; the white on the side of the forehead in front of the base of the ears also varies in distinctness and extent; the spot under the eyes is generally distinct. This species is like *P. nigrifrons* and *P. musanga* in many

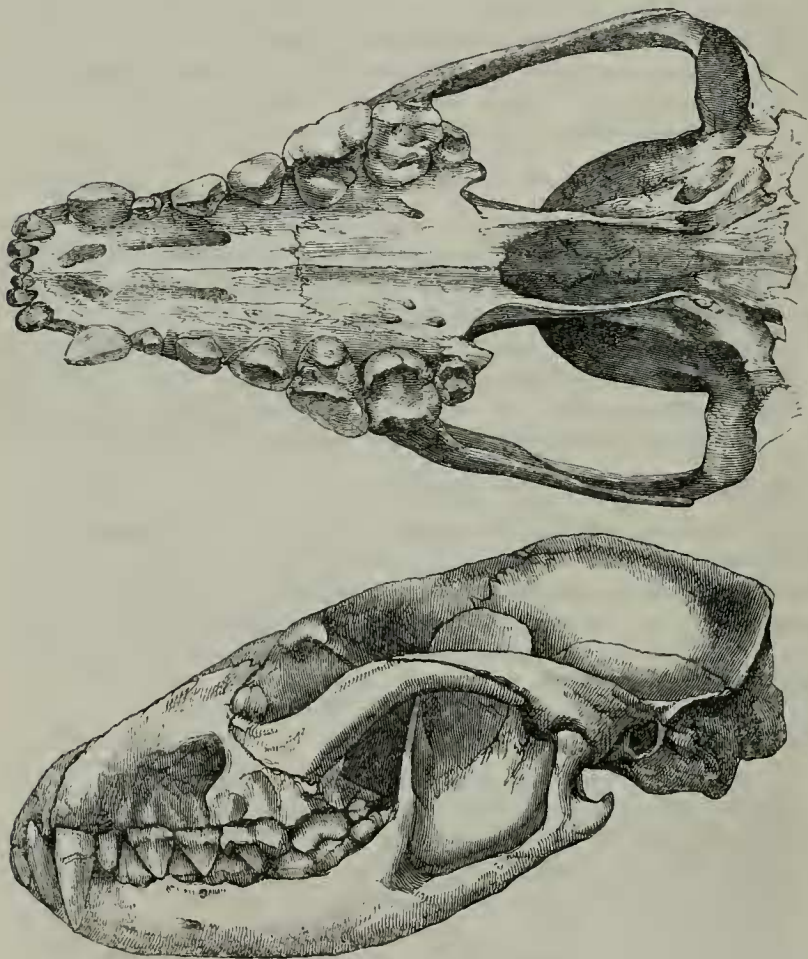
respects; but it differs from them both in the crown of the head being paler like the back, and from *P. nigrifrons* in having three dorsal stripes; but in one specimen, from the Philippines, these stripes are quite invisible; yet in every other respect this is like the other specimens, and it differs from the specimen of *P. nigrifrons* in the colour of the crown.

Third upper false grinder with a well-marked linear tubercle on the hinder inner edge; the flesh-tooth tubercular, the outer edge not longer than the width of the front margin; front tubercular tooth oblong, the inner and outer edge of about the same width, smaller than in *P. zeylanicus*.

9. PARADOXURUS MACRODUS.

B.M., type.

The skull with a rather elongated nose; the third upper false



Skull of *Paradoxurus macrodus*.

grinder has a well-marked cingillum and a rudimentary lobe on the inner side. The flesh-tooth is very massive, with four large and two

small cones ; the inner lobe occupies more than half the inner part of the tooth, with two unequal cones, the front one being nearly as large as the middle one on the outer side. The front tubercular very large, oblong, with nearly equal sides and large tubercles ; the hinder upper tubercular much smaller, circular.

Length of skull 4'' 4''', of nose 1'' 6''' ; width of brain-case 1'' 5''' , of zygoma 2'' 3'''.

*Hab.* — ?

This skull was received from the Museum of the Zoological Society ; it was marked in the catalogue, "Skull of a Genet undetermined."

#### 15. PAGUMA.

*Paguma*, Gray, Zool. Misc. 9, 1831 ; Proc. Zool. Soc. i. 95, 1831 ; ii. 65, 1832.

? *Amblyodon*, Jourdan, Compt. Rend. 1837.

Nose flat beneath, with a central longitudinal groove. The skull broad, short. Brain-case broad between the orbits, only moderately constricted in front ; forehead triangular behind, extending beyond the back edge of the orbits. The orbit very incomplete, with a very short acute prominence above behind, and none on the zygomatic arch below ; hinder part of palate broad, with a very slight notch on each side of its front edge ; the front of the palate broad, about as wide as three-fourths of its length. Teeth small or moderate ; flesh-tooth triangular, the front edge about as broad as long on the outer edge ; the front tubercular oblong, inner edge shorter, rounded.

The skull of this genus is easily known by the distinct forehead, the edge of the temporal muscles even in the oldest specimen leaving a plane triangular space over the back of the eyes.

This genus was first established on an animal that had not completely shed its teeth ; but the examination of the adult skull has justified the separation.

The following are the most prominent peculiarities of the skulls of the three species :—

1. *P. larvata* is the smallest, has the broadest nose, as shown by the shape of the roof of the mouth or palate, and the smallest teeth.

2. *P. grayi* is next in size, has a longer and narrower nose, larger teeth, and a larger and more convex forehead.

3. *P. leucomystax* is the largest, with a short, very broad nose, and wide palate, and very large massive teeth.

The hinder opening of the palate in *P. larvata* and *P. leucomystax* is angularly cut out behind ; in *P. grayi*, arched out. The brain-case is widest and least contracted in front in *P. larvata* and *P. leucomystax*, and most so in *P. grayi*. This contraction becomes more decided as the specimens increase in age.

\* *Skull short ; brain-case scarcely constricted in front ; the nose very broad.* *Paguma*.

#### 1. PAGUMA LARVATA.

B.M., type.

Fur grey brown ; head, neck, whiskers, feet, and end of the tail

black; chest, streak up the face and forehead, and spots above and beneath the eyes whitish grey.

*Paguma larvata*, Gray, P. Z. S. 1830, p. 95; 1831, p. 65; Gerrard, Cat. Osteol. B. M. 79.

*Gulo larvatus*, Temm.; H. Smith, Griffith's A. K. ii. 281, t.

*Viverra larvata*, Gray, Spic. Zool. 9.

*Paradoxurus larvatus*, Gray, P. Z. S. 1832, p. 67; Illust. Ind. Zool. t.; Temm. Monogr. ii. t. 65. f. 1-3, t. 55. f. 1-3 (skull); Esq. Zool. 120; Schinz, Syn. Mamm. i. 384.

*Hab.* China (*J. Reeves*, 1827); Formosa (*Swinhoe*).

M. Temminck has confused *Paradoxurus grayi*, *P. nipalensis*, and *P. laniger* with this species, and gives Himalaya and Thibet as the habitat (see Esq. Zool. 126).

Flesh-tooth oblong, trigonal, rounded at the corners, about as wide as the length of the outer edge; the inner lobe occupying nearly the whole of the inner side, rounded internally. The soles are bald nearly to the heel. The hair is dull grey brown, with a black ring and whitish tips; the hairs of the blacker part are black nearly to the base; the white on the chest is spread out laterally on the front of the shoulder.

M. Temminck, after giving the proper synonyms of this species, continues, "M. Ogilby indique encore *Paradoxurus laniger*, Hodgson, et *P. grayi*, Bennet" (Proc. Zool. Soc. for 1836, p. 118); and adds, "Patrie: M. Ogilby, qui a vu à Londres une douzaine d'individus de cette espèce, me dit qu'elle vient du continent de l'Inde. Elle vit dans toute la chaîne basse des monts Himalaya. Le plus grand nombre vient du Népal. Il est probable que le sujet du musée dans les Pays-Bas vient aussi de cette contrée, ayant été acquis à Londres."—*Mon. Mamm.* ii. 331.

The whole of these observations of Mr. Ogilby refer to a species quite distinct (indeed having no relation to *P. larvata*), which does inhabit Nepal, while *P. larvata* has not hitherto been received from anywhere but China, and appears to be the species of that country. It is the less excusable that M. Temminck should have made such a comparison, when the true habitat is given in the description of the animal in the 'Proceedings of the Zoological Society,' which he quotes, and I have never yet seen the *P. larvata* alive in this country.

## 2. PAGUMA LEUCOMYSTAX.

B.M., type.

Black brown with elongated black shining hairs; orbits dark brown; face pale, without any orbital spots, a large spot at the lower angle of the ear; tip of the tail black (rarely white); whiskers rigid, white; ears large and rounded, not bearded.

*Paguma leucomystax*, Gray, Cat. Mam. B. M. 55; Gerrard, Cat. Osteol. B. M. 79.

*Paradoxurus leucomystax*, Gray, Loud. Mag. N. H. 1837; S. Müller, Verh. i. 55; Temm. Monogr. ii. 325, t. 64. f. 4-6 (skull); Schinz, Syn. Mamm. i. 383.



Var. 1. Tip of tail white; white on face more extended:—

*Paradoxurus jourdani*, Gray, Loudon's Mag. N. H. i. 579, 1837, from Mus. Leyden.

*P. ogilbii*, Fraser, Zool. Typica, t.; Temm. Esq. Zool. 120.

*P. leucocephalus*, Gray, Voy. Samarang. (B.M.)

*P. philippensis* (partly), Schinz, Syn. 387.

Var. 2. Albino.

*Hab.* Sumatra and Borneo (*Mus. Leyden.*).

The lower and longest whiskers are white, and the upper ones (which are placed just above them) are black and more slender.

The half-grown specimen, which I described as *Paradoxurus leucocephalus*, appears, on recomparison with the series of specimens, to be only a specimen with more white on the head than usual. The fur is in a bad state, the animal having been kept in confinement. The tip of the tail is white, as in the *P. ogilbii* of Fraser, which agrees with it in the whiteness of the head.

\*\* *Skull rather longer; brain-case slightly constricted in front; nose rather elongate, narrower; teeth small.* Amblyodon.

### 3. PAGUMA GRAYI (type), Bennett & Hodgson.

B.M.

Fur long and rigid, rather woolly, iron-grey, beneath paler; base of ears and sides of nose browner; tail elongate, flat at the base.

*Paguma grayi*, Gray, Cat. Mamm. B. M. 54; Cat. Hodgson Coll. 9; Gerrard, Cat. Osteol. Brit. Mus. 78; Horsfield, Cat. India House Mus. 66.

*Paradoxurus grayi*, Bennett, P. Z. S. 1835, p. 18.

*P. larvatus*, var., Temm. Esq. Zool. 120 (!).

*P. bondar*, Temm. Monog. ii. 332, t. 55. f. 1-4 (skull, not syn.).

? *P. leucopus*, Ogilby, Zool. Journ. iv. 303, ? var.

*P. nipalensis*, Hodgson, Asiatic Research. Bengal, xix. 76, 1836; Schinz, Syn. Mamm. i. 387.

*Amblyodon doré*, Jourdan, Ann. Sci. Nat. viii. 276, 1837.

*Paradoxurus auratus*, De Blainville, Ostéographie (Viverra), t. 12 (teeth).

*Hab.* India: Nepal.

The spot on the side of the face, under the eye, is sometimes very indistinct. The blackish ends of the hairs of the back, when crowded together at the crease of the neck, and when brushed towards the middle of the back, give the appearance of a dark band or streak; but there is no real band or streak in this species.

Skull swollen. False grinders moderate, rather compressed, conical, blunt, without any internal process; the flesh-tooth triangular, rather longer on the outer edge than the width of the front edge; the internal tubercles triangular, rather behind the front edge, inner side rather angular; tubercular grinders oblong, transverse, about as wide as the length of the outer edge, inner side narrower and rounded; hinder tubercular very small, circular.

Length of skull  $4'' 6\frac{1}{2}'''$ , of nose  $1'' 5\frac{1}{2}'''$ ; width of brain-case  $1'' 6'''$ , of zygoma  $2'' 6'''$ .

This skull is much more ventricose, and the head is much shorter and broader, than in *P. bondar*.

*Paradoxurus leucopus*, Ogilby, Zool. Journ. iv. 300, t. 35, 1829, Temm. Esq. Zool. 120, "band round the loins, the feet, and the tip of the tail pure white," is probably, from the description, an accidental variety of the *P. grayi*. The specimen does not appear to have been preserved.

I believe the specimen which I described in 1837, under the name of *P. jourdani*, 'Mag. of Nat. Hist.' i. 579, from a specimen which M. Jourdan purchased in London for the Lyons Museum, is the same as the one here described.

The only character that M. Jourdan gives is the following:— "Cette à laquelle il a donné le nom d'*Amblyodon doré* est celle qui offre la disposition dentaire la plus omnivore, celle qui, par conséquent, rappelle le mieux ce qui a lieu dans les *Rasores*, chez lesquels les deux bords dentaires sont presque égaux en hauteur et en épaisseur, également tuberculeux, et ont les deux arrières molaires approchant le plus d'être égales et semblables dans leurs côtés interne et externe."

"L'*Amblyodon* a un pelage fort grossier, rude, assez long et presque unicolore, seulement plus foncé en dessus, autour des yeux, avec les extrémités noires en dessus, comme la *Mustela*."—*Ann. Sci. Nat.* viii. 276, 1837.

This character suits more than one Indian species; but fortunately M. de Blainville, in his valuable 'Ostéographie,' has figured a skull under the name of *Paradoxurus auratus*, which is probably the one named by M. Jourdan, and certainly is the same as the *Paradoxurus grayi* of Mr. Bennett. It may be observed that M. Jourdan was in England shortly after I had described the species in the 'Magazine of Natural History': he saw my specimens, and even referred to my paper in his 'Mémoire' (p. 275); but he redescribed my *Paradoxurus derbianus* as *Hemigale zebra*, and *P. jourdani* as *Amblyodon doré*, without reference to their synonyms, though the latter is from the same specimen, I believe, as I described with his permission.

*Paradoxurus laniger*, Hodgson, MS. (*Paguma laniger*, Gray, Cat. Mamm. B. M. 55).

*P. larvatus*, var., Temm. Esq. Zool. 120 (!); Monogr. ii.

*Hab.* Nepal (Hodgson).

This species is only known from a skin without any skull, and in a very bad state.

## 16. ARCTOGALE.

*Arctogale*, Peters, Handb. für Zool. 98 (ined.).

Head conical. Nose compressed, flat, and with a central groove beneath. Whiskers slender, very long, brown. Ears rounded, covered with short hair. Toes 5—5; claws short, retractile. Soles

of hind feet broad, bald nearly to the heel. Tail elongate, slender, subcylindrical. The frenum covered with hair. Teeth 40.

Skull elongate. Nose produced. Brain-case rather wide, but constricted and subcylindrical in front. Forehead broad, angular behind, and extending beyond the back edge of the orbits. The orbits nearly complete behind, there being an elongated slender process from the side of the forehead and a well-marked angle on the upper edge of the zygomatic arch. Hinder part of the palate very narrow, with a deep notch on each side in front, on a level with the hinder tubercular; front of palate as wide as two-thirds its length. Teeth small; the flesh-tooth triangular, with a long, narrow internal lobe; tubercular grinders oblong, the first nearly as long as broad.

“I have formed this into a genus, on account of the smallness of the teeth and the protraction of the palate.”—*Peters's Letter*, Nov. 11, 1864.

I had already distinguished the genus, but gladly adopt Dr. Peters's unpublished name to prevent the useless increase of generic names.

#### ARCTOGALE TRIVIRGATA.

B.M., type.

Blackish brown, slightly silvered with the pale tips to the hairs; back with three narrow black streaks; throat, chest, and undersides dirty white; the head and tail black; feet blackish brown.

*Paguma trivirgata*, Gray, *Cat. Mamm. B. M.* 55; Gerrard, *Cat. Osteol. B. M.* 79; Temm. *Monogr.* ii. 335, t. 53. f. 1 (skeleton); Horsfield, *Cat. India House Mus.* 64.

*Viverra trivirgata*, Reinhardt, in *Mus. Leyden.*

*Paradoxurus trivirgatus*, Gray, *P. Z. S.* 1832, p. 67; Temm. *Esq. Zool.* 120.

*P. lævidens*, fide Parzudaki's MS.

*Hab.* Java and Sumatra (*Temm.*); Malacca (*Finlayson*); Tenasserim (*Blyth*).

The black streak varies in distinctness and length in the different specimens, being sometimes very black and extending from the back of the head to the base of the tail, in others only distinctly visible in the middle of the back. The head and end of the tail are always blacker, and the throat whitish. There is no white spot under or above the eye; so that it cannot be *Viverra hermaphrodita* of Pallas, which is described as having three dorsal streaks; and I cannot observe any baldness of the frenum in the stuffed specimens. The tail in some lights looks as if it were very obscurely marked with narrow blackish rings; but they are not distinctly defined in any light.

The Museum procured a young specimen from M. Parzudaki, of Paris, under the name of “*P. lævidens*, inter *P. larvatum* et *P. grayi intermedius*, Ceylon.” The habitat and the affinities are mistakes.

*Species of this group requiring further examination.*

PARADOXURUS STIGMATICUS, Temm. *Esq. Zool.* 120.

Fur short and smooth; that of the nape, upper part of the body, the

sides, the four members, and the tail is red-brown, with a silvery lustre; the silky hairs of all parts are tipped with yellowish white. Head black brown, with a fulvous lustre; a pure-white longitudinal band extends from the forehead to the origin of the muffle, covering the ridge of the nose; the ears naked externally, with the base of the inner side hairy. The tail and the end of the tail chocolate.

Length of head and body 17 inches, tail 19 inches.

*Hab.* Borneo (*Schwaner, Temm., Mus. Leyden.*).

A single, very old, male specimen. Size and form of *P. trivirgatus*.

**PARADOXURUS LEUCOTIS**, Blyth, in Horsf. Cat. India House Mus. 66.

Fur rather long, soft, silky; of upper part of the body, neck, head, and two-thirds of the tail tawny, becoming reddish brown on the back and sides; thighs and legs, throat and abdomen, lighter; tail very long, and deep chestnut-brown; whiskers long, blackish brown; nose with a central white line; ears scarcely covered with scattered yellowish hairs.

*Hab.* Tenasserim, Arracan (*Mus. India*).

**PARADOXURUS STRICTUS.**

*Paradoxurus strictus*, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. 105.

General colour grey, with a slight rusty shade; two prominent white spots on each side of the head, one beneath the eye oblong, tending forward, one behind the eye larger, triangular, tending backward; five continuous stripes, regularly defined and straight, of a deep black colour, commencing on the neck, extend over the whole length of the body, having on each side beneath an interrupted band of black spots. Abdomen grey. Tail exceeding the body in length; mixed grey and black at the base; the terminal portion black, the colour increasing in deepness towards the extremity. Legs black. Throat grey, with a medial black stripe. Ears developed.

Length from the snout to the root of the tail 23 inches, of the tail 25 inches.

*Hab.* India.

**PARADOXURUS QUADRIScriptus.**

*Paradoxurus quadriscriptus*, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. 106; Gray, P. Z. S. 1853, p. 191.

General colour grey, with a slight rufous shade extending over the whole of the body, over one-half of the tail, over the forehead and the lower part of the ear. On the back and parts adjoining, four well-defined continuous black stripes pass from the neck to the rump, having a shorter interrupted band on each side. The bridge of the nose in the middle, a well-defined narrow streak from the canthus of the eye, the neck, the feet, and the terminal part of the tail are black; on the upper part of the neck the hairy covering is slightly variegated black and grey, the separate piles being grey at

the base and black at the tip. The fur is soft, lengthened, and straggling.

The entire length of this species is 50 inches, 26 of which are occupied by the head and body, and 24 by the tail.

I could not discover any external differences between the specimens which Mr. Hodgson sent, under the name of *P. quadriscryptus*, from Nepal, and *P. musanga* (see Proc. Zool. Soc. 1853, p. 191). The skull has not been compared.

PARADOXURUS PREHENSILIS, Gray, P. Z. S. 1832, ii. 66; Illust. Ind. Zool.; Horsf. Cat. India House Mus. 63; Temm. Esq. Zool. 120.

*Ichneumon prehensilis*, Hamilton, MS. India House.

*Viverra prehensilis*, De Blainv. in Desm. Mamm. 208.

*Hab.* India.

The species, which has only been described from Dr. Buchanan Hamilton's drawing, copied in my 'Indian Zoology,' has not yet occurred to me. M. Temminck, who never could have seen it, states it to be "a constant variety" of *Paradoxurus musanga* (Esq. Zool. 120); but, as far as I know, *P. musanga* is confined to the Malay Islands.

PARADOXURUS FINLAYSONII, Gray, P. Z. S. 1832, p. 68, from Mr. Finlayson's drawing in Library of E. India Company; Horsfield, Cat. India House Mus. 65.

*Hab.* Malacca (*Finlayson's drawing*).

Probably the same as *P. musanga*.

PARADOXURUS CRASSICEPS, Pucheran, Rev. et Mag. Zool. vii. 392; Arch. für Naturg. 1856, p. 43.

PARADOXURUS ANNULATUS, Wagner, in Schreber's Säugeth. Suppl. ii. 253; Schinz, Syn. Mamm. i. 386.

*P. supra niger fulvo mixtus, subtus ferrugineus, lutescens; cauda nigro annulata, auriculis dense pilosis.*

*Hab.* —? (*Mus. Munich*).

#### Tribe 9. CRYPTOPROCTINA.

*The hinder part of the tarsus bald and callous; the tail long, covered with long flaccid hair; the head short, subglobose; the orbit of the skull incomplete behind.*

#### 17. CRYPTOPROCTA.

*Cryptoprocta*, Bennett, P. Z. S. 1832, p. 46; Trans. Zool. Soc. i. 137.

Head conical. Whiskers rigid, very long. Ears large, covered with short hair externally. Nose with a distinct, naked, central longitudinal groove below. Tail elongate, covered with long flaccid hair. Soles of feet naked. Toes united by a web.

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## CRYPTOPROCTA FEROX.

B.M.

Fur pale brown; hair short, uniform, that of the back with a small pale tip; under fur dusky.

*Cryptoprocta ferox*, Bennett, P. Z. S. 1833, p. 46; Trans. Zool. Soc. i. 137, t. 14; Gerrard, Cat. Ost. B. M. 81; De Blainv. Ost. Atlas, 15, 96, t. 6 & 12; Schinz, Syn. Mamm. i. 381.

*C. typicus*, A. Smith, S. African Quart. Journ. ii. 134.

*Hab.* Madagascar (*Charles Telfair*).

The skull of the *Cryptoprocta*, with its milk-teeth, is ovate, with a very short, rather compressed nose, large orbit, imperfect behind, and very short, much turned-out, slender zygomatic arches. The teeth are somewhat like those of a *Viverra malaccensis* of the same age; but the face is much shorter, and the palate broader in front, and the flesh-tooth more compressed longitudinally. The false grinders  $\frac{2}{3}$ ; the upper front are small and much worn. The flesh-tooth is long, compressed, with slight processes, without any tubercle on the middle of the inner side. The tubercular is triangular; the front edge rather the longer; the outer edges oblique, and inner one narrow, rounded, with three slightly raised tubercles on the front, and one on the hinder part of the crown.

Length of the skull 3 inches; width of brain-case, over ears,  $1\frac{1}{3}$  inch, at zygomatic arch  $1\frac{2}{3}$  inch.

The *Cryptoprocta* "has an anal pouch, and when violently enraged it emits a most disagreeable smell, very like that of *Mephites*; when at liberty, it lies constantly in a rolling position, sleeping always on its side or even on its back, holding with its fore feet the small wires of its cage."

See M. J. Geoffroy's observations on this genus (Mag. Zool. 1839, p. 25). He says it is very different from *Galidia*—which no one could doubt, if he studied the description of the feet:—

"Le *Cryptoprocta* de Bennett, peut-être le même que l'*Eupleres* de M. Doyer, semble plutôt être le représentant des *Paradoxures* de Madagascar."—*Jourdan, Ann. Sci. Nat.* viii. 272, 1837. This is a mistake, as any one may prove, by comparing the skulls, which are both figured in De Blainville's 'Ostéographie.' M. Pucheran also appears to think that this animal and the one described as *Eupleres goudotii* may not be different (see Rev. et Mag. Zool. 1858, p. 40).

II. THE DOG-FOOTED VIVERRIDÆ (*Cynopoda*).

The hind feet slender; underside bald, or more or less covered with scattered hairs. The toes slender, free, compressed, straight, slightly hairy; the claws exerted, exposed, blunt at the end. The orbit of the skull complete, or only slightly imperfect on the hinder edge. The body elongate; legs generally short. The fur is generally harsh, grizzled. The back is not crested. The tail conical or cylindrical, hairy, not dark-ringed. The anal pouches shallow, or not present.

A. *The nose short ; underside flat, with a central longitudinal furrow.* Herpestacea.

Tribe 10. HERPESTINA.

*Head elongate, conical ; tail conical or cylindrical ; back streaked ; claws elongate, compressed.*

18. GALIDICTIS.

*Galidictis*, I. Geoff. Compt. Rend. 1837, p. 580 ; Mag. Zool. 1839, t. 18 ; Schinz, Syn. Mamm. i. 360 ; Gray, P. Z. S. 1848, p. 21 (not Hodgson).

*Galictis*, I. Geoff. Compt. Rend. 1837, p. 581.

Nose flat, and with a groove below. Ears moderate. Tail bushy. Whiskers slender. Toes 5—5 ; front claws elongate, compressed, much arched ; thumb low down, with a long claw. Hinder toes :—third and fourth longest, subequal ; great toes low down ; claws all moderate, compressed. Soles broad, bald the whole width to the heel. False grinders 3/3. Tail subcylindrical, curved, with long hairs. Back streaked.

1. GALIDICTIS VITTATA.

B.M.

*Galidictis vittata*, Gray, P. Z. S. 1848, p. 21, pl. 1 ; in Zool. Sulphur, t. ; Coquerel, Mag. de Zool. xi. 465, t. 18. f. 2.

Grey, black-and-white grizzled ; back and sides with eight nearly equal, parallel, narrow, black-brown streaks ; chin and beneath pale brown ; hind feet and outer sides of fore legs reddish brown ; tail subcylindrical, bushy, black-and-grey grizzled, white towards the end ; hairs elongate, brownish white, with two, rarely three, broad black rings.

*Hab.* Madagascar (*T. Thompson*) (*Mus. Brit.*).

The skull described in the Proc. Zool. Soc. is not quite adult ; it has a small adult false molar.

2. GALIDICTIS STRIATA.

Pale brown ; seven or nine longitudinal black streaks, the middle one on each side behind short ; head and limbs pale brown ; tail whitish.

*Galidictis striata*, I. Geoff. Mag. de Zool. 1839, t. 18, 19 ; Schinz, Syn. Mamm. i. 360 ; Gerrard, Cat. Ost. B. M. 76.

*Galictis striata*, I. Geoff. Compt. Rend. Acad. Sci. 1837, p. 581.

*Mustela striata*, Geoff. Mus. Paris. ; Fischer, Syn. Mamm. 224.

*Pictorius striatus*, Cuvier, Règne An. ed. 2, p. 144.

*La Belette grise de Madagascar*, Sganzin, Rev. et Mag. Zool. 1855, 41.

*Hab.* Madagascar.

In the figure the brain-cavity is nearly three-fifths the entire length of the skull ; and the skull at the widest part of the zygomatic arch is as large as the brain-cavity. Skull oblong, rather elongate ; brain-cavity rather more than half the entire length ; orbit very incomplete behind ; forehead arched ; crown flat ; upper false grinders two, com-

pressed; the flesh-tooth elongate, trigonal, much longer than broad at the front edge—the internal tubercle moderate, on the front edge; tubercular grinders transverse, the first rather trigonal, narrow on the inner side, the second oblong, much smaller (see I. Geoff. *l. c.* t. 19).

b. *Back grizzled; claws short, curved.*

#### 19. HERPESTES.

*Herpestes*, Illiger.

*Mangusta*, Olivier.

*Ichneumon*, Geoff.

Body elongate; limbs moderate; back grizzled. Tail conical, covered with long hairs. Toes 5—5; claws short, compressed. Pupil linear, erect. Skull elongate. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth elongate, narrow, longer than broad on the front edge; tubercular grinders transverse.

\* *Animal large; hair of body and tail long, harsh; tail ending in a black pencil.*

#### 1. HERPESTES ICHNEUMON.

B.M.

Grey, hairs largely ringed; head and middle of the back darker; legs reddish; feet and end of tail black, with a long flaccid pencil; under fur short, reddish.

*Herpestes ichneumon*, Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73.

*Viverra ichneumon*, Linn. S. N.

*Herpestes pharaonis*, A. Smith, S. A. Quart. Journ. i. 49; Schinz, Syn. Mamm. i. 367.

*Ichneumon pharaonis*, Geoff. Mém. Egypt.

*Mangusta ichneumon*, Fischer, Syn. 163.

*Ichneumon ægypti*, Tiedem. Zool. i. 364.

*Mangouste d'Égypte*, F. Cuv. Mamm. Lith. t.

*Mangouste d'Alger*, F. Cuv. Mamm. Lith. t.

*Hab.* North Africa: Egypt; Senegal (*Reade, B. M.*); Cape Eilpila, 1850.

The skull is elongate, rather slender; the brain-case (that is, from the occiput to the back edge of the orbit) is three-fifths of the entire length; the crown is straight; the forehead arched and rather convex; the orbits are not quite complete behind. The teeth are normal, moderate-sized; the flesh-grinders of the upper jaw rather narrow, the front being two-thirds the length of the outer edge; the front tubercular trigonal, transverse; the hinder one small and oblong, transverse. Length  $3\frac{8}{12}$  inches, width at zygomatic arch 2 inches—the same as the length of the brain-case; width of brain-case  $1\frac{5}{8}$  inch. The skull is contracted in front, just over the back edge of the orbits. Lower jaw very shelving in front; false grinders  $\frac{4}{4}$ ; tubercular grinder oblong, elongate, moderate, with a very obscure anterior lobe, two lateral and one larger hinder lobe.



## 2. HERPESTES CAFFER.

B.M.

Like the preceding, but darker ; under fur shorter, red ; end of tail with a long, black, flaccid pencil.

*Herpestes caffer*, Licht. Verz. der Säugeth. 1835 ; Wagner, Gel. Anz. ix. ; Gray, Cat. Mamm. B. M. 51 ; Gerrard, Cat. Ost. B. M. 73 ; Schinz, Syn. Mamm. i. 368 ; A. Smith, S. A. Q. J. 50.

*Viverra caffra*, Gmelin, S. N.

*Ichneumon pharaonis*, Verreaux.

*Hab.* S. Africa, on plains away from the sea ; Natal (*Kraus*).

The skull of *H. caffer* is elongate, larger and longer than that of the adult *H. ichneumon*, and is more convex on the forehead and behind the orbit. The front of the brain-case is contracted some distance behind the back edge of the orbit, while in *H. ichneumon* this contraction is just over that part. The zygomatic arch is very long, much longer than in *H. ichneumon*, and not so arched out as it is in the latter species. Like as the two species are externally, they are very distinct in the form of their skulls. The teeth of the two species are very similar ; but the teeth of *H. caffer* are considerably longer, stronger, and rather wider proportionately, especially the tubercular teeth.

Length of skull 4 inches ; width at zygomatic arch  $2\frac{1}{8}$  inches, of middle of brain-case  $1\frac{5}{8}$  inch.

Lower jaw very shelving in front, with a prominence on the lower edge under the end of the tooth-line ; false grinders  $\frac{4}{4}$  ; tubercular moderate, oblong, with two anterior lateral and one larger posterior prominence.

The great difference between the skulls of these two species, which are so like externally, should act as a caution to naturalists, who complain so frequently that species are often separated on too slight external characters. Temminck, for example, would unite *H. ichneumon*, *H. caffer*, and *H. widdringtonii* as one species, and at most only as "permanent local varieties," whatever those may be.

## 3. HERPESTES DORSALIS.

*Ichneumon pharaonis*, var., A. Smith, S. A. Q. J. 49.

"Back with a narrow, moderately distinct, golden-yellow stripe from nose to tip of tail, and another on each side of the face, which diverges from the front, passes over the eyes, and terminates on the side of the head.

"*Hab.* South Africa.

"Length : head and body 18 inches ; tail 15 inches (not adult)."

## 4. HERPESTES WIDDRINGTONII.

B.M.

Like *H. pharaonis* ; but fur shorter, under fur more abundant and longer, giving the animal a reddish tint ; tail pencilled, distinct, but shorter :

*Herpestes widdringtonii*, Gray, Ann. Nat. Hist. ix. 49, 1842 ; Cat. Mamm. B. M. 51 ; Gerrard, Cat. Ost. B. M. 73 ; Schinz, Syn. Mamm. i. 375.

*Hab.* South of Europe : Sierra Morena (*Widdrington*).

## 5. HERPESTES NUMIDIANUS.

B.M.

*Herpestes numidianus*, F. Cuvier, Mamm. Lith. t. ; Verreaux, MS.

Like *H. ichneumon*, but blacker ; the rings of the hairs very distinct ; throat, legs, and feet black.

*Hab.* Numidia (*Verreaux*).

## 6. HERPESTES MADAGASCARIENSIS.

*Ichneumon madagascariensis*, A. Smith, S. African Quart. Journ. 56.

“ Hair of the head, throat, breast, belly, and lower part of the extremities short, that of the other parts longer. The colour of the upper and lateral parts of head and of lower parts of extremities brown red freely speckled with black and white ; the upper and lateral parts of the neck, body, and the whole of the tail speckled, being black, brown red and pale reddish white, each hair annulated with these three colours, which are darkest upon the back ; throat and lower part of the neck pale tawny ; breast, belly, and inner side of extremities dirty pale rufous, speckled with white ; woolly hair yellowish white ; tail rather thick towards the root, very slender at the point ; outer surface of ears thickly covered with short brownish-yellow hairs, inner surface more thickly with a dull tawny sort ; whiskers black ; nails dark horn-colour. Length of body and head  $15\frac{1}{2}$  inches, of tail 14 inches.

“ *Hab.* Madagascar (*A. Smith*).

“ Size and form of *H. caffer*, but colours much lighter ; and when placed side by side, various other differences are evident.”

## 7. ? HERPESTES BENNETTII.

Red brown, slightly grizzled with whitish ; tail rather depressed, underside pale red, tip black-pencilled.

*Herpestes bennettii*, Gray, Loudon's Mag. N. H. i. 578.

*Hab.* Madagascar (*Mus. Zool. Soc.*). Specimen not to be found.

## 8. HERPESTES JERDONII.

B.M.

Grey, closely and broadly white-ringed ; the head darker ; the feet darker brown, only slightly annulated ; tail conical, with a black pencil of elongated, flaccid, black hairs.

*Hab.* Asia : Madras (*Jerdon*, 1846).

This is very like *H. ichneumon*, but rather paler.

Length of head and body 19 inches, of tail 17.

Skull (aged) elongated ; orbit complete. The false grinders  $\frac{3}{4}$  ; the front very small ; the second and third triangular, with an internal lobe. The flesh-tooth narrow, elongate ; outer edge much longer than the width of the front margin ; internal lobe small, slender, on the front edge. Tubercular transverse ; first triangular, very short and broad, outer edge oblique, inner part very narrow, acute ; second very small, oblong. The hinder part of the palate contracted, with a small wing on each side on the upper, and with an acute keel on each side of the lower edge, ending in a long process behind, with

a nodus on the outer side near the end; internal opening narrow, transverse. Lower jaw rather strong; chin shelving, lower edge straight, angle produced, lobe keeled on the inner upper margin. Length of skull about 2" 3''' (imperfect), of nose 11'''; width of back of mouth 1" 1'''.

*Ichneumon edwardsii*, Geoff. Egypt, 138, from Edw. Birds, 199. t. 199.

*Ichneumon major*, Geoff. l. c. 139, from *Grande mangouste*, Buff. Supp. iii. 173, t. 28. These species are only known from the figures cited.

\*\* *Smaller animal: hair shorter; tail with a small black or red tip.*

#### 9. HERPESTES APICULATUS.

B.M.

Fur harsh, dark grey, grizzled with broad black-and-white rings; hair rather elongate, with black tip and a broad white subterminal band; tail with a very slight black tip, from the dark end of the terminal hairs.

*Herpestes apiculatus*, Gray, Cat. Mamm. B. M. 51.

*H. pulverulentus*, Wagner, Supp. Schreb. Säugeth. t. 116. f. 2; Schinz, Syn. Mamm. i. 374.

*H. caffer*, Verreaux, MS.

Length 14 inches; tail 11 inches. (B.M.)

*Hab.* South Africa, Cape of Good Hope, on rocks near the sea (*A. Smith*).

\*\*\* *Smaller animal: hair of body shorter; tail coloured like the back.*

† *African.*

#### 10. HERPESTES PUNCTATISSIMUS.

Fur short; the hairs at the base of the tail twice as long as those of the body; the upper part of the body and limbs pale yellow, dotted with very fine blackish-brown rings, covering all the parts except the chin; the middle part of the neck and belly dirty white; the hairs of the tail, to the extreme point, have many rings; the tip of the tail pale reddish.

Length of head and body 10½ inches, tail 9 inches.

*Herpestes punctatissimus*, Temm. Esq. Zool. 108.

*Hab.* Central and Eastern Africa (*Temm.*, *Mus. Leyden.*).

Teeth very strong, much larger than others of the same size.

#### 11. HERPESTES LOEMPO.

B.M.

Under fur pale ochraceous; longer hairs black-tipped; fur of head, neck, and back yellow-dotted; back and nape blacker; tail variegated at the base and tufted with long black hairs, which are yellowish at the base; legs deep black.

*Herpestes loempo*, Temm. Esq. Zool. 93, 1853.

*H. mutgigella*, Verreaux, MS. (not Rüppell).

*Arompo*, Bosman, Guinea, 33. f. 8.

In the specimen not in complete fur the ochraceous undercoat is seen through the longer hairs.

*Hab.* Guinea, near the graves. (Called "Loempo" by a negro at Guinea.)

This species has the toes and other parts of the body, and especially the form of the tail, of *Ichneumon*, but the normal teeth of *Herpestes* (Temm. 94).

The skull is long, ventricose; face and forehead flat, shelving gradually to the back of the orbit, and then shelving in a straight line towards the hinder part of the head. The cavities for the temporal muscles are very large, and they extend in front, and meet together on the crown at a line rather in front of the hinder edge of the orbit. The orbits are large, the hinder edge entire; the hinder part of the skull is broad; the hinder part of the palate between the temporal muscles is narrow and elongate, the hinder opening being nearer the hinder than the front edge of the temporal fossæ. The hinder grinders are slender; the crown of the flesh-tooth is triangular, the front side being the shortest, with the inner tubercle on the straight front edge.

## 12. HERPESTES PLUTO.

B.M.

Black; sides of the head, neck, and front of the body pale brownish, with broad white subterminal bands on the ends of the hairs; hairs harsh; tail black, grey at the base, hairs not ringed at the end; front of thighs, legs, and feet black.

*Herpestes pluto*, Temm. Esq. Zool. 93, 1853.

*Hab.* Guinea (*Temminck*); West Coast of Africa (*Gerrard*), adult; ? East Africa (*Verreaux*).

The adult specimens from *Gerrard* and *Verreaux* are rather paler than the younger one from *Leyden*; length of head and body 20 inches, tail 14 inches. Younger from *Guinea*, length of body and head 16 inches, tail 11 inches. They have also a slight indication of a crest of longer black hairs on the back of the neck.

Skull short, broad; nose shelving; forehead convex; crown flat; orbits complete. False grinders 3/3; first conical, blunt; the second compressed; the third trigonal, with a distinct internal and hinder tubercle. Flesh-tooth rather longer than wide on the front edge; the inner tubercle on front edge, broad, rounded. Tubercular grinders transverse; the front about twice as wide as long, rounded on the inner edge; the second smaller, rather oblong, with two well-marked tubercles, rather narrower and more acute on the hinder part of the inner edge.

Skull—length  $3\frac{1}{2}$  inches; width at zygoma  $2\frac{1}{10}$  inches, of brain-cavity  $1\frac{1}{4}$  inch.

"Like the *H. loempo*; the head and muzzle longer; tail shorter, covered with hairs like those of the body; fur of body, limbs, and

tail intense shining black ; under fur sombre or dark brown ; the fur of the chin, throat, and cheeks black, with very small yellow dots ; all the rest intense black. The younger are marked with very fine dots, produced by the yellow rings on the black hairs."—*Temm.*

This does not agree with the specimen (which appears to be changing its teeth) which we received from the Leyden Museum.

### 13. HERPESTES IODOPRYMNUM.

"*Supra ex albido griseoque variegatus, capite, collo, maniculis atque podariis cinerascens, hypochondriis viridi-griseis, prymna saturate castanea, pectore, abdomine cristaque unicoloribus ex rufescente isabellinis; cauda longe disticha, basim versus villosissima, supra et infra ad apicem nigrum usque castanea, rhinario et plantis denudatis nigris.*

"Long. tota 24 inches.

*Herpestes iodoprymnus*, Heuglin, Nov. Acta Leop. xxix. 23.

"*Hab.* Eastern Abyssinia."

### 14. HERPESTES LEFEBVRII.

*Herpestes lefebvrii*, DesMurs et Prevost ; Heuglin, Nov. Act. Leop. xxix. 23 ; Lefebvre, Voy. Mamm. t. 1 (not described).

*Hab.* N.E. Africa (*Heuglin*).

†† *Asiatic.*

### 15. HERPESTES GRISEUS.

B.M.

Pale grey, largely white-ringed ; head and legs darker ; hairs harsh, elongate, with a very broad, white, subterminal ring ; feet blackish ; tail bushy ; cheeks and throat more or less reddish.

*Herpestes griseus*, Desm. Mamm. 212 ; Ogilby, Proc. Zool. Soc. 1835 ; Gray, Cat. Mamm. B. M. 52 ; Gerrard, Cat. Ost. B. M. 75 ; Horsfield, Cat. India House Mus. 90.

*Ichneumon griseus*, Geoff. Egypt. ii. 157.

*Maugusta grisea*, Fischer, Syn. Mamm. 164.

*Herpestes pallidus*, Schinz, Syn. Mamm. i. 373.

*Viverra grisea*, Thunb. Mém. Acad. Pétersb. iii. 306.

*Hab.* India : Bengal (*Oldham*) ; Travancore (*P. Poole*) ; "Sumatra" (*Raffles, Waterh. Cat.*) ; Dukhun (*Sykes*) ; Nepal (*Hodgson*).

Var. Paler, with a reddish tinge, and the pale rings rather narrower.

*Hab.* India (*Hardwick*).

Skull and teeth normal ; orbit complete ; nose short, thick ; false grinders 3—3, first conical, roundish, third triangular. Flesh-tooth rather longer than broad in front. Tubercular transverse ; the first with the outer side sloping ; the hinder small, oblong, short. Lower jaw shelving in front. Skull—length  $2\frac{3}{4}$  inches ; width of brain-case  $2\frac{3}{4}$  inches, at zygomatic arch  $1\frac{5}{8}$  inch.

## 16. HERPESTES PERSICUS.

B.M.

Pale ashy, very closely and abundantly black-and-white punctulated; hair short and soft, with black ends and a broad white band near the tip; the chin and underside uniform ashy; tail conical, tapering, coloured like the back; feet like the back, but with shorter hair.

*Hab.* Persia: Rhugistan and Mohammerah, date-groves (*Kennet, Loftus*, 1853).

Skulls (adult) rather elongate; nose short; forehead very broad, convex; the orbits complete; lower jaw moderately strong, chin shelving. Teeth 40, normal; the third false grinder subtriangular, with small, central, prominent lobe; the flesh-tooth elongate, sub-trigonal, the outer side considerably longer than the front one, the inner tubercle small, on the front edge; the front tubercular triangular, transverse, with a very sloping outer edge. Length of skull 2" 6<sup>'''</sup>, of nose 7½<sup>'''</sup>; width of under palate behind 9½<sup>'''</sup>, of brain-case 10<sup>'''</sup>, of zygomatic arch 1" 3<sup>'''</sup>.

Somewhat like *Calogale nyula*, but much paler and more uniform in dotting; the head shorter and broader, and the tail conical, tapering, thicker at the base.

## 17. HERPESTES FUSCUS.

B.M.

Black brown, white-dotted; hair very long and harsh; ends black, with a narrow pale band very near the tip; throat and belly reddish brown; tail bushy, like the back.

*Herpestes fuscus*, Waterhouse, P. Z. S. 1838, p. 55; Gerrard, Cat. Ost. B. M. 74; Schinz, Syn. Mamm. i. 372.

*Hab.* India (*Waterhouse*); Madras (*Jerdon*, 1846).

Mr. Waterhouse's type is in the B. M.: length of body and head 10 inches, tail 17 inches. The one from Madras is smaller.

The skull is intermediate in form between that of *H. ichneumon* and that of *H. paludosus*; the brain-case is nearly of the same external form as the latter, but not quite so ventricose; the orbit is small and rather incomplete behind; the zygomatic arch is rather convex, but, as in *H. ichneumon*, the convexity is more on the hinder end, while it is regularly bowed out in *H. paludosus*. The teeth of the upper jaw are very like those of *H. ichneumon*; but the outer edge of the front tubercular is not so oblique, and the hinder tubercular is even smaller; they are very much slenderer and less bulky than the teeth of *H. paludosus*. Lower jaw very shelving in front; lower edge arched, narrow behind; false grinders 4—4; tubercular oblong, elongate, rather small, crown four-lobed, one lobe at each end and two in the middle portion.

The length of the skull 3½ inches; the width of the brain-case 1¼ inch, of the zygomatic arches 1½ inch.

## 18. HERPESTES JAVANICUS.

B.M.

Dark black brown, very minutely punctured with yellow; head redder; tail conical; claws short, conical.

*Herpestes javanicus*, Desm. Mamm. 212; Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 372; Horsf. Cat. India House Mus. 88.

*Mangusta javanica*, Horsf. Zool. Java, t.

*Mustela galera*, Desm. (fide icon. ined.).

*Viverra mangusta*, Temm.

*Ichneumon javanicus*, Geoff. Mém. Egypt, ii. 157.

*Hab.* Java and Sumatra (*Horsfield, Müller*); Penang and Malay peninsula (*Cantor*).

*Young.*—Pale bay; some of the hair of the tail with long grey tips.

*Hab.* Sumatra (*Raffles*).

#### 19. HERPESTES SEMITORQUATUS.

B.M.

Dark red brown, very slightly punctulated; cheeks and side of the neck uniform pale bay; legs and feet black; tail black, with some white tips to the hairs.

Length of body and head 18 inches, tail 11 inches.

*Herpestes semitorquatus*, Gray, Zool. Sulphur, t. 3. f. 1-3, 1849; Gerrard, Cat. Ost. B. M. 74.

*Hab.* Borneo (*Belcher*).

Like *H. brachyurus* in some respects; but the tail is longer, and the sides of the neck bright pale red, separated from the other parts by a defined line.

The skull is not quite adult, much broader compared with its length than even that of *H. paludosus*. The contraction in the front of the brain-cavity is slight, and rather in front of the back edge of the orbit. The orbit is rather large, and slightly incomplete behind; the zygomatic arch is rather short, and not much bowed out. The teeth are normal, and very like those of *H. ichneumon*; they occupy a rather shorter space. Length of the skull  $3\frac{1}{8}$  inches; width of the brain-case  $1\frac{5}{12}$ , of the zygomatic arch  $1\frac{1}{2}$  inch. Skull short and broad.

Lower jaw: chin shelving; lower edge arched, without any prominence under the end of the tooth-line; false grinders 4-4; the front false grinder small, deciduous; the tubercular grinders oblong, longitudinal, with two unequal anterior and one large posterior tubercle.

#### 20. HERPESTES EXILIS.

“*Pallide flavo nigroque annulatis; capite et dorso cinnamomeo et nigro annulatis; pedibus nigrescentibus, gula cinnamomea, ventre pallidioro; cauda pilosa, non penicillata, palmis plantisque nudis.*”

“Long. corp.  $10\frac{1}{2}$  inches, caudæ 8 inches.”

*Herpestes exilis*, Eydoux, Zool. de la Bonite, t. 3. f. 7-9; Schinz, Syn. Mamm. i. 375.

“*Hab.* East Indies, Touranne (*Eydoux*).”

#### 21. HERPESTES MALACCENSIS.

Dull ashy, beneath rather paler; hairs black, white-and-yellow

ringed; orbits, ears, and tip of nose naked, violet; tail the colour of the body, very thick at the base, ending with yellow hairs.

*Herpestes malaccensis*, F. Cuv. Mamm. Lithog. t.

*Mangusta malaccensis*, Fischer, Syn. 164.

*Herpestes pallidus*, var., Schinz, Syn. Mamm. i. 373.

*H. frederici*, Desm. Dict. S. Nat. xxix. 60.

*H. leschenaultii*, Schinz, Cuv. Thierr. t.

*Hab.* Malacca, Pondicherry (*Leschenault*).

\*\*\*\* *Smaller; tail like back, much shorter than the body.*

## 22. HERPESTES BRACHYURUS.

B.M.

Black, hairs yellow-ringed; under fur brown; face, cheeks, and sides of neck yellower; belly and tail darker; throat pale yellow brown; fore legs and feet blackish; tail thick, about half as long as the body. Length of head and body 18 inches, tail  $7\frac{1}{2}$  inches.

*Herpestes brachyurus*, Gray, Mag. N. H. i. 578, 1836; Voy. of the Samarang, Mam. t. 4. f. 123, 1849; Gerrard, Cat. Ost. B. M. 74.

*Mangusta brachyura*, De Blainv. Ost. Atlas, t. 6.

*Hab.* Borneo (Malacca).

The skull is most like that of *H. caffer*, but shorter; the brain-case, the zygomatic arches, and the face are shorter and more ventricose; the forehead broader and regularly convex. The constriction of the front of the brain-case is rather behind the orbit, and not much contracted; the orbit is rather small and complete behind. The teeth are normal, and very like in proportion and form to those of *H. ichneumon*, but rather larger in all parts, as the skull is larger; brain-case five-eighths of entire length.

Length of the skull  $3\frac{5}{8}$  inches; width of brain-case  $1\frac{2}{8}$  inch, at zygomatic arch  $2\frac{1}{2}$  inches.

## 20. ATHYLAX.

*Atilax*, F. Cuvier, Mamm. Lithogr. 1826, iii. t.

*Athylax*, I. Geoff. Mag. Zool. 1837; De Blainv. Plates.

*Galera*, Brown, Hist. Jam. i. 85, 1756.

Like *Herpestes*, but teeth and jaws stronger. Toes 5—5; claws blunt. Skull elongate. Teeth 40, normal, very massive, with large acute tubercles on the crown; the false grinders  $\frac{3}{4}$ . The lower jaw very strong, with a well-marked chin, and a tubercle on the lower edge under the posterior end of the tooth-line (De Blainv. Ost. Viverra, t. 5). The grinders much longer and broader, with larger and higher tubercles, and the hinder upper tubercular grinder much larger than in most, if not in any other, of the genera; but in the disposition and number of the tubercles they are just like those in the other species.

M. I. Geoffroy compares this genus with his *Galidia*, and concludes that they are distinct (see Mag. de Zool. 1839, p. 25).



This genus is separated from *Herpestes* by the large size and thickness of the teeth and the strength of the lower jaw, with its two distinct prominences. The skull and lower jaw of both species, if they are distinct, are figured by De Blainville, as above referred to.

### 1. ATHYLAX VANSIRE.

*Atilax vansire*, F. Cuvier, Mamm. Lithog. 411. t.; Dict. Sci. Nat. t.

*Mustela galera*, Erxl. Syst. 453; Schreb. Säugeth. t. 155.

*Viverra galera*, Shaw.

*Herpestes galera*, Desm. Mamm. 212; Wagner, Gel. Anzeig. ix.

*Mangusta galera*, Fischer, Syn. 165.

*Mangouste vansire*, Geoff.

*Mangusta (Athylax) galera*, De Blainv. Ostéogr. Viverra, t. 5 (skull).

*Ichneumon vansire*, A. Smith, S. A. Q. J. 53.

*I. galera*, Geoff. Hist. Egypt, 138.

*Vansire*, Buffon, H. N. xiii. 157, t. 21.

*Hab.* Madagascar.

According to De Blainville's figure, the skull is more solid and stronger than that of *A. paludosus*.

Temminck thinks this a variety or local state of *Herpestes paludosus* (Esq. Zool. 100).

The description of the *Vansire*, from a stuffed specimen, is as follows:—"The fur is less long than that of a Marten or Polecat, of the same dark brown colour on all parts of the body; the under fur is brown; the longer hairs are brown at the roots; the remainder blackish and reddish, which succeed each other at small intervals to the tip. These two colours occupy all the length of the hairs of the tail. Toes 5—5. Length of body and head 13 inches, tail 7 inches, hair  $2\frac{1}{2}$  inches long. Madagascar."—*Buffon*, H. N. xiii. 169, t. 21.

In the figure, the claws are represented as long, compressed, arched, acute.

The skull of the animal figured by F. Cuvier is engraved in De Blainv. Ostéogr. t. 5.

### 2. ATHYLAX PALUDOSUS.

B.M.

Brown, closely yellow-punctulated; hair elongate.

*Herpestes paludosus*, Cuv. R. A.; Gray, Cat. Mamm. B. M. 52; Gerrard, Cat. Ost. B. M. 74.

*Mangusta urinatrix*, A. Smith, Zool. Journ. iv. 237.

*H. palustris*, Rüppell.

*H. griseus*, Burchell, Cat.

*H. caffer*, Mus. Stuttgart.

*H. paludinosus*, Peters, Reise Mossamb. Säugeth. 119.

*H. atilax* (partly), Schinz, Syn. Mamm. i. 371.

*Ichneumon urinatrix*, A. Smith, S. African Quart. Journ. i. 51.

*Mangusta paludinosus*, De Blainv. Ostéogr. Viverra, t. 5 (skull), t. 12 (teeth).

*Hab.* S. Africa, Cape of Good Hope, on the banks of the rivers ; a great diver (*A. Smith*) ; E. Africa, Quillimane (*Peters*).

*Var.* Black-brown, only very slightly punctulated, except on the side of the throat.

*Var.* Canine teeth very strong,

*Hab.* Guinea (*Gervais*).

The skull is wider, compared with its length, than in most species of the genus ; the brain-case is more convex ; the contraction in the front of the brain-case is not so great or so sudden as in *Herpestes ichneumon* and *H. caffer*, and is only a very small distance behind the hinder edge of the orbit. The orbit is very incomplete behind. The teeth are normal ; they are all much more bulky and broader than in any of the other species of the genus which I have seen ; the hinder upper false grinder is triangular, with nearly equal sides ; the flesh-tooth is very strong, the front edge being nearly four-fifths of the length on the outer side ; the first tubercular is not twice as broad as the length of the outer edge. The brain-case is about five-eighths of the entire length. The hinder part of the palate contracted, flat, with a diverging crest on each side above, and a ridge on each side below, with the aperture transverse, in a line with the base of the lateral crest. The bullæ large, vesicular, rounded below and behind.

Length of the skull  $3\frac{1}{2}$  inches ; width of brain-case  $1\frac{1}{2}$  inch, at zygomatic arch  $2\frac{1}{6}$  inches.

The zygomatic arch, in comparative length and convexity, is very like that of the skull of *H. ichneumon*.

Lower jaw strong, short, with a distinct chin-angle in front ; teeth very large and strong ; tubercular oblong, longitudinal, large, with two anterior and one broad hinder lobe, the angle behind with flattened expanded processes.

### 3. ATHYLAX ROBUSTUS.

B.M.

Brown, very minutely and closely punctured ; the head blacker, with a subvertical band ; the edge of the lower jaw and cheeks under the ears yellowish, not punctulated ; legs and feet nearly black ; tail black brown, punctulated.

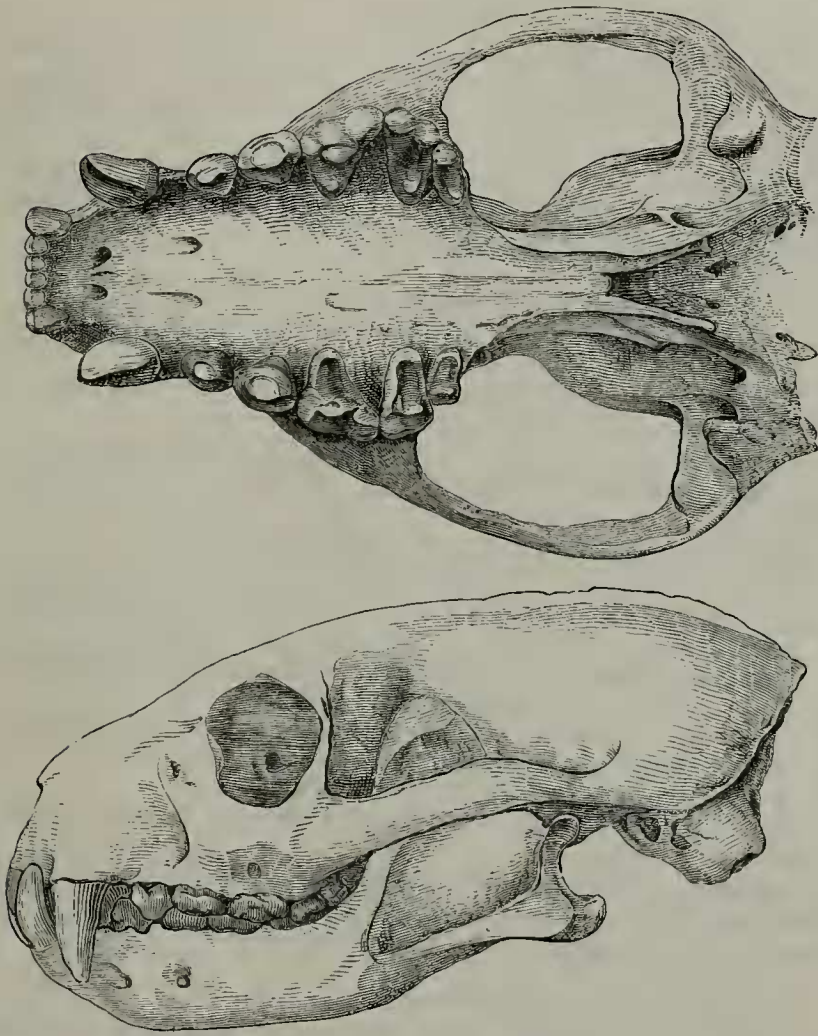
*Hab.* Africa : "White Nile" (no. 6168, adult ; no. 6169, younger) (*Parzudaki*).

Very like *A. paludosus*, but paler, and with the pale cheeks ; the teeth are very large and strong, like those of the *A. paludosus* variety from Guinea.

Lower jaw like that of *A. paludosus*, but not quite so strong, and more sloping in front ; the compressed teeth rather large ; the tubercular oblong, elongate, moderate, with two large lobes in front, and one larger behind.

Skull elongate ; nose short, thick ; forehead convex ; orbits complete. Teeth 36 ; the false grinders  $\frac{2}{3}$ , with a short space between the canine and the first false molar, where a small tooth may have fallen out. The false grinders triangular, with a triangular tubercle on the middle of the inner side. The flesh-tooth massive,

triangular, nearly as wide in front as long on the outer side, with a large internal tubercle on a line with the front edge. Tubercular



Skull of *Athylax robustus*.

grinders transverse; the front triangular, much wider than long, outer edge oblique, inner edge narrow; hinder one oblong, much smaller. The hinder part of the palate produced nearly to a line with the condyles, keeled on each side, and with a strong keel on each side of the lower surface, edging the very narrow contracted hinder opening. Ear-bullæ very large, vesicular, rounded below and behind. Lower jaw strong, solid, nearly as high behind as in front; chin shelving; gonyx long, the angle produced, bent up at the end, and keeled on the outer lower edge. Length of skull  $4\frac{6}{12}$  inches,

of nose  $1\frac{1}{2}$  inch; width of brain-case  $1\frac{1}{2}$  inch, of back of mouth  $1\frac{1}{2}$  inch, of zygomatic arch  $2\frac{1}{2}$  inches.

## 21. CALOGALE.

Body elongate. Tail very long, slender, cylindrical, covered with short hair, with longer at the tip. Toes 5—5; claws short, triangular, acute. Pupil linear, erect. Skull elongate; brain-case elongate, two-thirds the length of skull (see Peters, Reise, t. 28). Teeth 40; false grinders  $\frac{2}{3}$ ,  $\frac{2}{3}$ , compressed; flesh-tooth narrow, much longer than broad, with inner tubercles on front edge; tubercular grinders  $\frac{2-2}{1-1}$ , transverse, hinder very small.

\* Tail like back, rather thick.

### 1. CALOGALE NYULA.

B.M.

Pale grey, very closely and minutely black-and-white punctulated; tail elongate, rather tapering, coloured like the back.

*Herpestes nyula*, Hodgson, J. A. S. Beng. 1836, p. 236; Gray, Cat. Mamm. B. M. 52; Gerrard, Cat. Ost. B. M. 75; Horsf. Cat. India House Mus. 92.

*H. pallidus* (partly), Schinz, Syn. Mamm. i. 373.

*H. nigula*, Hodgson, Calcutta Journ. N. H. iv. 287.

*Hab.* India: Nepal, Open Tarai (*Hodgson*); Salt Range (*Oldham*). Length of head and body 15 inches, tail 12 inches.

The largest species of the genus, but much smaller than *Herpestes griseus*, which it somewhat resembles.

Skull very like *H. griseus*, but nose longer; orbit complete, and more compressed and tapering; the flesh-tooth and the front tubercular grinder rather larger and more massive.

Skull—length  $2\frac{3}{4}$  inches; width at brain-case 1 inch, at zygomatic arch  $1\frac{1}{3}$  inch.

These animals have the tail rather more bushy than the more typical *Calogale*; but they have the narrow skull and longer narrow brain-case and slender narrow flesh-tooth of the genus.

### 2. CALOGALE NEPALENSIS.

B.M.

Dark grey, very minutely and closely punctulated, with black and pale-whitish hairs, with a broad subterminal pale band; tail subcylindrical, pencilled at the end, coloured like the back.

Length 13 inches, tail 11 inches.

*Herpestes nepalensis*, Gray, Mag. N. H. 578, 1836; Hodgson, J. A. S. Beng. 235; Gerrard, Cat. Osteol. B. M. 74; Horsfield, Cat. India House Mus. 91.

*H. auropunctatus*, Hodgson, J. A. Soc. Beng. i. 578; Schinz, Syn. Mamm. i. 373.

*H. javanicus*, Hodgson.

*H. griseus*, Hodgson, Journ. Asiat. Soc. Beng. xiv. 346.

*H. pallipes*, Blyth, J. Asiat. Soc. Beng. xiv. 346.

*Hab.* India: Nepal, hill regions (*Hodgson*); Assam (*M<sup>c</sup>Clelland*); Afghanistan (*Griffith*).

Skull—orbit complete, like *C. grisea* and *C. nyula*, but smaller; the nose short, like *C. grisea*, but more compressed; teeth normal, very like *C. nyula*, the hinder tubercular being larger than in *C. grisea*.

Skull, length  $1\frac{5}{12}$  inch; width at brain-case  $\frac{4}{5}$  inch, at zygoma  $1\frac{1}{4}$  inch.

### 3. CALOGALE RUTILA.

B.M.

Grizzled chestnut-brown, variegated with black and white rings on the hairs; head and limbs darker chestnut, with scarcely any, or very narrow, white rings; lips and throat and under part of the body uniform duller brown, not grizzled; ears brown; the nape with longer hairs, forming broad short crests.

*Herpestes rutilus*, Gray, P. Z. S. 1861, p. 136.

*Hab.* Cambogia (*Mouhot*), one specimen.

### 4. CALOGALE MICROCEPHALA.

Head very small; teeth very small; ears close, short; nose very short and narrow. Fur finely dotted all over, deep brown and dull yellow, of the under part dirty white; the under fur ashy at the base, with a very broad yellow band; the hairs silky, blackish brown, with small ochraceous rings; the hairs of the tail with broader rings, those of the tip similar.

Length of head and body 10 inches, of tail  $9\frac{1}{2}$  inches.

*Herpestes microcephalus*, Temm. Esq. Zool. 113.

*Hab.* —? (*Mus. Leyden, procured at Havre*).

\*\* *Tail-end bright bay, very slender.*

### 5. CALOGALE SANGUINEA.

Head ashy, black-dotted; body isabella-red; hair with tip and rings brown; throat, chest, and belly white; feet pale; tail isabella and black, varied, tip bright red brown.

Length of head and body  $11\frac{1}{2}$  inches, of tail  $12\frac{1}{2}$  inches.

*Herpestes sanguineus*, Rüpp. Fauna Abyss. 27, t. 8 & 10 (skull); Schinz, Syn. Mamm. i. 370.

*Hab.* Abyssinia.

### 6. CALOGALE GRANTII.

B.M.

Pale yellow brown, nearly uniform, very slightly grizzled, with white tips to the hairs; end of tail bay.

*Herpestes badius*, Sclater, P. Z. S. 1864, p. 100.

*Hab.* East Africa: Mgunda Mkali (*Capt. Speke*).

\*\*\* *Tail-end black, very slender.*

### 7. CALOGALE MUTGIGELLA.

B.M.

Dark olive-brown, very minutely punctulated; tail-end black.

Length of body and head  $13\frac{1}{2}$  inches, of tail  $11\frac{1}{2}$  inches.

*Herpestes mutgigella*, Rüpp. Fauna Abyss. t. 9. f. 1; Gray, Cat. Mamm. B. M. 51; Gerrard, Cat. Osteol. B. M. 75; Schinz, Syn. Mamm. i. 370.

*Hab.* Abyssinia.

Skull rather elongate, narrow, like that of *C. nyula*; nose flat; forehead and crown in one line; brain-case ovate, flat-topped, contracted in the front over the orbit; orbit incomplete; false grinders 2-3/3, front small, hinder rather compressed, with a small internal and a small hinder acute tubercle; flesh-tooth much longer than broad—inner tubercles small, on front edge; tubercular grinders transverse, the first trigonal, the outer edge broader, the inner narrow, acute; the second very small, nearly like the first in form.

Skull  $2\frac{1}{2}$  inches wide at the broadest part; brain-case 1 inch.

#### 8. CALOGALE ORNATA.

*Herpestes ornatus*, Peters, Monatsb. Akad. Berlin, 1852, p. 81; Reise n. Mossamb. Säugeth. i. 117, t. 26, 1852; Gerrard, Cat. Osteol. B. M. 75; Temm. Esq. Zool. 115.

*Hab.* Eastern Africa: Tete, lat. 17 (*Smith*).

The figure is very like *C. mutgigella*; but the grizzling of the back seems to form more irregularly waved cross streaks; perhaps this is only the attempt of the artist to represent the grizzling. The figure of the skull also resembles that of the former species.

Temminck regards this as a variety of *C. mutgigella* (Esq. Zool. 116).

#### 9. CALOGALE PUNCTULATA.

B.M.

Reddish grey, minutely black-and-grey punctured; face redder; under fur black; long hairs brown, upper half whitish, with a broad black subapical band and a bay tip; tail-end black; front claw rather slender, acute; inner toes very short, claws short.

*Herpestes punctulatus*, Gray, P. Z. S. 1849, p. 11.

*H. badius*, var. 2, Temm. Esq. Zool. 105.

*Hab.* South-east Africa: Port Natal (*Williams*).

Like *C. mutgigella*, but redder; face red bay.

#### 10. CALOGALE MELANURA.

B.M.

Reddish brown, minute, punctulate; hair short; tail-end black; front claws acute, short.

*Cynictis melanura*, Martin, P. Z. S. 1830, p. 56; Fraser, Zool. Typica, t.; Gerrard, Cat. Ost. B. M. 77; Schinz, Syn. Mamm. i. 377.

*Herpestes melanura*, Gray, P. Z. S. 1838, p. 5.

*H. badius*, var. 3, Temm. Esq. Zool. 107.

*Hab.* West Africa, Sierra Leone (*Capt. P. L. Strachan*); Damara Land (*Alexander*).

Var.? Rather paler (not in good state). B.M.

*Herpestes ochromeles*, Pucheran (*fide* Verreaux).

*Hab.* "Central Africa" (*Verreaux*).

Skull elongate, very much contracted in front over the orbit; the flesh-tooth trigonal, longer than broad; hinder tubercular very minute, transverse.

11. CALOGALE BADIA. B.M.

Bright bay, nearly uniform; end of tail black.

Young? pale brown, with an obscure waved appearance from the broad bands on the hairs.

*Herpestes badius*, A. Smith, *Illust. Zool. S. A. Mamm. t. 4, ♀*; Gray, *Cat. Mamm. B. M. 51*; Gerrard, *Cat. Ost. B. M. 74*; Schinz, *Syn. Mamm. i. 373*; Temm. *Esq. Zool. 98?*

*Ichneumon ratlamuchi*, A. Smith, *App. Report, 1836, p. 42.*

*Herpestes cawii*, A. Smith.

*Hab.* South Africa, on plains away from the sea; ? Guinea (called "Koukeboe") (*Temm.*), perhaps a variety or species.

M. Temminck thinks that *Herpestes punctatus* and *Cynictis melanura* are varieties of this species (*Temm. Esq. Zool. 100*).

Skull rather elongate, compressed; brain-case elongate, contracted in front; orbit complete in the adult, incomplete in the young. The false grinders 3—3; the first very small; second compressed, conical; third subcompressed, placed obliquely, with a very minute, scarcely appreciable internal lobe, and no hinder one. Flesh-tooth trigonal, considerably longer than broad; the internal lobe small, on the front edge. The first tubercular grinder transverse, outer edge oblique, inner (narrower) rounded; the second very minute, linear, with two tubercles.

12. CALOGALE VENATICA. B.M.

Dark bay, white-grizzled, the longer hairs white-tipped; tail-end black.

*Herpestes badius*, var., Gray, *P. Z. S. 1849, p. 11*; Peters, *Reise n. Mossamb. Säugeth. 119.*

*Hab.* East Africa.

13. CALOGALE GRACILIS. B.M.

Brown or blackish brown, scarcely grizzled; fur on side of the neck shorter and very minutely grizzled; end of tail blacker.

*Herpestes gracilis*, Rüppell, *Fauna Abyss. t. 8. f. 1, t. 10*; Schinz, *Syn. Mamm. i. 369.*

*Ichneumia gracilis*, I. Geoff. *Mag. Zool. 1839, p. 17*; Gray, *Cat. Mamm. B. M. 53*; Gerrard, *Cat. Ost. B. M. 76.*

*I. nigricaudatus*, I. Geoff. *MS., l. c. 18.*

*Hab.* Abyssinia (*Rüppell*).

M. I. Geoffroy objects to the name, because this species is stouter than the other *Herpestæ*; he does not appear to have seen any specimen. (*Mag. Zool. 1839, p. 18*).

## 14. CALOGALE? THYSANURA.

*Minor, pilis fusco et pallide luteo annulatis; pedibus fuscis; cauda longa, penicillo magno aterrimo terminata.*

Length of head and body 12 inches, of tail 13 inches.

*Herpestes thysanurus*, Wagner, München. gelehrt. Anz. ix. 449; Schreb. Säugeth. Supp. ii. p. 301; Schinz, Syn. Mamm. i. 368.

*Hab.* India: Cashmere.

## 22. GALERELLA.

Body slender. Legs short. Tail elongate, slender, tapering; covered with shortish hairs. Toes 5—4. Claws short, compressed, acute. Skull elongate; brain-case rather ventricose. Face short. Teeth 38; false grinders  $\frac{3}{3}$ ,  $\frac{3}{3}$ ; flesh-tooth triangular, longer than broad; tubercular grinders  $\frac{2}{1}$ ,  $\frac{2}{1}$ , transverse.

## GALERELLA OCHRACEA.

B.M.

Pale brown, minutely punctulated; throat, underside, and inside of the limbs white; tail-end black; front thumb very small, low down.

*Cynictis ochraceus*, Gerrard, Cat. Ost. B. M. 77.

*Herpestes ochraceus*, Gray, P. Z. S. 1848, p. 138, pl. VIII.; Ann. & Mag. N. H. 1849, iv. 376.

*H. mutgigella*, var., Temm. Esq. Zool. 116.

*Hab.* East Africa: Abyssinia (*F. H. Hora*).

M. Temminck regards this as only a seasonal state of *H. mutgigella* (Esq. Zool. 116), not observing that it has no internal toe on the hind feet.

Skull elongate; brain-case rather ventricose; face short, forehead arched; flesh-tooth triangular, much longer than broad, inner tubercle anterior; false grinders  $\frac{3-3}{2-2}$ ; the hinder tubercular very small; orbit incomplete behind; not so contracted in front over the back of the orbit. Like *Calogale badia* in size, but brain-case more ventricose.

## 23. CALICTIS.

The pupil oblong, transverse. Claws rather arched, compressed. Tail thick, conical, tapering. Ears rounded. Skull elongate. Face short. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; the flesh-tooth triangular, scarcely longer than broad; tubercular grinders  $\frac{2-2}{1-1}$ .

The skull elongate, rather narrow, much contracted in front of the brain-case; orbit rather incomplete; the nose shelving; crown flat. The false grinders  $\frac{3}{3}$ ; the first very small; second compressed; third trigonal, with a small internal and a small hinder lobe. The flesh-tooth triangular, scarcely longer than broad in front, the inner lobe on the front edge. Tubercular grinders transverse; the first sub-trigonal, oblique, much broader than long; the second very minute.

The skull  $\frac{3}{4}$  inches long, and brain-cavity  $\frac{1}{4}$  inch broad behind.



## CALICTIS SMITHII.

B.M.

Reddish brown, very closely pale-grizzled, hair with red-brown ends, and subconical white bands; feet and tip of tail black.

*Herpestes smithii*, Gray, Loudon's Mag. N. Hist. 1837, i. 2; Cat. Mamm. B. M. 51; Proc. Zool. Soc. 1851, p. 131, pl. xxxi.; Ann. & Mag. N. H. 1853, xii. 47; Gerrard, Cat. Ost. B. M. 74; Temm. Esq. Zool. 97.

*Hab.* Ceylon (*A. Grace*).

M. Temminck, misled by some dealer, believes that this animal inhabits Cape Coast and Guinea. He complains of the shortness of my diagnosis; but says himself it is well characterized by a shorter but nearly identical one (see Temm. Esq. Zool. 98).

## 24. ARIELA.

*Helogale* (part.), Gray, P. Z. S. 1861, p. 308.

Body elongate. Tail slender, elongated, subcylindrical, thickest at the base. Toes 5—5. Skull elongate. Face short. Teeth 40; false grinders  $\frac{2-2}{3-3}$ ; flesh-tooth trigonal, rather broader than long, inner lobe long, rounded, on front edge; tubercular grinders 2/1, 2/1.

## ARIELA TÆNIONOTA.

B.M. (skull only).

Hair of head, under part of neck, and lower part of the extremities short, elsewhere pretty long; centre of the face, forehead, crown, cheeks, and space between the eyes and ears black, freely pencilled with white. Muzzle, upper and lower lips, and space under lower jaw light chestnut; outer surface of the ears brownish, inner surface dirty reddish white; back and sides of neck, shoulders, anterior part of back and sides, and outer surface of anterior extremities finely pencilled black and white; the rest of back and upper part of sides banded transversely deep black and yellowish white or light yellow-brown; flanks and outer surface of hinder extremities towards the body pencilled dull black and yellowish white; lower part of neck, breast, belly, and lower surface of extremities black; tail slender, thickest towards the root, for about two-thirds of its length pencilled black-brown and pale ferruginous; last third nearly uniform black.

Length of head and body 15 inches, of tail  $7\frac{1}{2}$  inches.

*Helogale tænionota*, Gray, P. Z. S. 1861, p. 308; Gerrard, Cat. Ost. B. M. 76.

*Herpestes tænionotus*, A. Smith, S. African Journ. 52, 1834.

*H. zebra* (partly), Schinz, Syn. Mamm. i. 371.

*Ichneumon tænionotus*, A. Smith, S. Afr. Quart. Journ. 50.

*Hab.* South Africa: Natal (*A. Smith*).

The flesh-tooth broader than long; the inner lobe long, rounded, on the front edge. The first false grinders conical, compressed; the second trigonal, with an internal tubercle. The tubercular grinders transverse; the first large, with a long internal lobe, rather thinner, narrower than the outer edge, and rounded within. Orbit incomplete behind. Skull elongate.

## 25. ICHNEUMIA.

*Ichneumia*, I. Geoff. Compt. Rend. 1837, p. 582; Mag. Zool. 1839, pp. 13 & 31.

*Lasiopus*, I. Geoff. Cour. d'Hist. Nat. des Mamm. 57, 1835.

Body compressed. Legs rather long. Fur grizzled. Tail conical, bushy. Toes 5—5. Claws rather elongate, sharp. The greater part of the soles of the hind feet are covered with hair. Teeth 40; false grinders  $\frac{3-3}{4-4}$ ; flesh-tooth triangular; tubercular grinders  $\frac{2-2}{1-1}$ .

The most Viverrine form of this subtribe.

M. Geoffroy separates this genus on account of its peculiar dentition, which he describes:—false grinders  $\frac{3}{4}$ , true  $\frac{1}{1}$ , tubercular  $\frac{2}{1}$  (Mag. Zool. 1839, p. 7). M. Geoffroy's figures are lower on their legs and more vermiform than our specimen of *I. albicauda*.

Dr. A. Smith, when first describing this species, observed, "Its teeth exhibit a slight difference in form, and are not so closely set as in the true Ichneumons. This peculiarity, in addition to the state of the soles of the feet, may, when its manners and habits are better known, require it to be separated from the present genus" (South African Quart. Journ. 52, 1834).

"Shorter and more robust, and stands higher on its limbs, than *Herpestes*."—*A. Smith*.

## 1. ICHNEUMIA ALBICAUDA.

B.M.

Tail white, nearly to the base.

*Ichneumia albicauda*, I. Geoff. Mag. Zool. 1839, p. 13, 35, t. 11; Gray, Cat. Mamm. B. M. 53.

*Herpestes albicaudus*, Cuvier, Règ. Anim. ed. 2, 1834.

*H. albicaudatus*, A. Smith, S. Afr. Quart. Journ. 181, 1834; Schinz, Syn. Mamm. i. 369.

*Mangusta albicauda*, De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Hab.* Africa: Port Natal (*A. Smith*); Senegal (*Heudelot*); Galam (*Delambre*).

## 2. ICHNEUMIA LEUCURA.

*Herpestes leucurus*, Ehrenb. Sym. Phys. Mamm. t. 12, cop. Schreb. Säugeth. t. 116; Rüppell, Abyss. Fauna, i. 27; Peters, Reise n. Mossamb. Säugeth. 119; Schinz, Syn. Mamm. i. 369.

*Hab.* East Africa: Nubia and Dongola (*Ehrenb.*).

This may be the same as the preceding. See observations of M. I. Geoffroy, Mag. Zool. 1839, p. 14, note.

## 3. ICHNEUMIA ALBESCENS.

Pale brown; tip of tail white.

*Ichneumia albescens*, I. Geoff. Mag. Zool. 1839, p. 35, t. 12; Gerrard, Cat. Ost. B. M. 76.

*Hab.* East Africa: Sennaar (*Botta*).

Skull ovate, swollen; the brain-cavity one-half the length; nose shelving; forehead and crown rather convex; orbit incomplete be-

hind. False grinders  $3/3$ ; the third triangular, sides of equal length, with an internal tubercle on the hinder edge. The flesh-tooth triangular, rather longer than wide in front, narrow behind; the internal tubercle anterior, rounded internally. The tubercular grinders large, oblong, trigonal, about half as wide again as long; the hinder rather the smallest (see I. Geoff. Mag. Zool. 1839, t. 13).

In the figure the brain-cavity is half the length of the skull, and the skull is as wide at the widest part of the zygomatic arch as the length of the brain-cavity.

#### 4. ICHNEUMIA NIGRICAUDA.

*Ichneumia nigricauda*, Pucheran, Rev. et Mag. Zool. vii. 39; Arch. für Naturg. 1856, p. 43.

*Hab.* Senegal.

#### 26. BDEOGALE.

*Bdeogale*, W. Peters, Reise n. Mossamb. Mamm. 119 (1850).

Toes 4—4, short. Heel hairy to the soles. Claws compressed. Tail bushy. Skull, orbits incomplete behind (t. 27 & 28). False grinders 3—3; hinder broad, triangular. Flesh-tooth triangular, broad; sides nearly equal; angles rounded (t. 27. f. 4).

*Hab.* Africa.

The teeth are like those of *Rhinogale*, and the nose is rather produced and rounded below in the figure; so that perhaps this genus ought to be arranged near to it; but it differs from it in having four toes on each foot.

#### 1. BDEOGALE CRASSICAUDA.

Blackish-ashy hair, black-and-white ringed; limbs and tail black.

*Bdeogale crassicauda*, W. Peters, Monatsb. K. Akad. Berl. 1852, p. 81; Reise n. Mossamb. Mamm. 120, t. 27; Temm. Esq. Zool. 115; Gerrard, Cat. Ost. B. M. 72.

*Hab.* East Africa: Tete, Boror (*Peters, Mus. Berlin*).

#### 2. BDEOGALE PUISA.

Brown hairs, black-and-yellow ringed; limbs and tail blackish brown.

*Bdeogale puisa*, W. Peters, Monatsb. K. Akad. Berl. 1852, p. 82; Reise n. Mossamb. Mamm. 124, t. 28; Temm. Esq. Zool. 115; Gerrard, Cat. Ost. B. M. 72.

*Hab.* East Africa: Mossimboa (*Peters, Mus. Berlin*).

#### 3. BDEOGALE NIGRIPES.

“Body whitish; tail snow-white; feet black.”

*Bdeogale nigripes*, Pucheran, Rev. et Mag. Zool. vii. 111; Arch. für Naturg. 1856, p. 44.

*Hab.* Gaboon (*Aubry Lecomte, Mus. Paris*).

“Larger than the other species.”

## 27. URVA.

*Urva*, Hodgson; Gray, Cat. Mam. B. M. 50.

*Mesobema*, Hodgson.

Head broad. Ears rounded. Nose rather produced, with a longitudinal groove beneath. Body elongate. Legs short. Tail conical, attenuated, covered with long hairs. Toes 5—5; claws compressed, rather short, curved; inner toes of fore and hind feet very short, with short claws rather high up the foot. Claws brown. Hind part of the soles of hind feet covered with hair, that is bent towards the centre on each side. The front part bald, oblong, narrow behind, occupying less than two-thirds of the foot, with three subequal pads in front and two elongated pads on each side of the hinder edge (Hodgson, J. A. S. B. t. 31. f. 5). Front upper false grinders 2, compressed; the third subtriangular, with a very small subposterior internal tubercle, and a small posterior marginal one; flesh-tooth large, elongate, triangular, nearly twice as long as the front margin, with a large internal lobe on the front edge; tubercular grinders transverse, twice as broad as long on the outer edge; hinder tubercular very small, oblong, transverse.

URVA CANCRIVORA. The *Urva*.

B.M.

Black-grizzled, hairs with a very broad white subterminal ring; a white streak on the side of the neck; legs and feet black; tail ashy red at the end.

*Urva cancrivora*, Hodgson, Journ. Asiat. Soc. Beng. vi. 560; Gray, Cat. Mamm. B. M. 50; Gerrard, Cat. Ost. B. M. 73; Schinz, Syn. Mamm. i. 358; Horsfield, Cat. India House Mus. 93.

*Mesobema cancrivorus*, Hodgson, Journ. Asiat. Soc. Bengal, x. 910; Calcutta Journ. N. H. ii. 214, iv. 287.

*Gulo urva*, Hodgson, Journ. Asiat. Soc. Beng. v. 238; Calcutta Journ. N. H. ii. 45, t. 13 $\frac{1}{2}$ . f. 2.

*Hab.* India—Nepal, in caverns, Central Northern region (*Hodgson*); Affghanistan (*Griffith*); Arakan (*Blyth*).

Fur lax, elongate, ringed, blackish ashy, more or less grizzled by the white tips to the hairs; lips and cheeks whitish; a long streak on the side of neck white; legs and feet black; tail bushy, appearing more or less irregularly banded from the dark band on the hairs.

The not quite adult skull of *Urva cancrivora* is very like that of *Teniogale vitticollis*, but considerably smaller. The orbit is incomplete. The zygomatic arches not so bowed out, with most convex part nearer the hinder end. The nose is rather thick. The contraction of the brain-case is just over the hinder part of the orbit; the brain-case is rather longer (perhaps  $\frac{1}{10}$ th) than the face. The teeth are normal, and very like in form and proportion to those of *T. vitticollis*; but they are rather narrower, and the first tubercular molar is shorter and broader, more oblong, and the hinder tubercular molar smaller. Length of the skull  $3\frac{1}{2}$  inches; width of the brain-case  $1\frac{4}{6}$  inch, of the zygomatic arch 2 inches.

Lower jaw slender; chin gradually shelving; the lower edge

curved, arched up behind, to near the condyle behind. The false grinders 4—4; the front small, concave. Tubercular grinders moderate, oblong, elongate, with two small anterior and two large high posterior prominences.

In the 'Illustrations of Indian Zoology' I figured an animal under the name of *Viverra ? fusca*, from one of General Hardwick's drawings. In the 'Ann. & Mag. Nat. Hist.,' 1842, p. 260, I proposed for it a genus named *Osmetectis*. As yet I have never seen or heard of an animal from India that agrees with the figure. It has been supposed that it may be *Urva cancrivora* of Hodgson; but it does not well represent that species.

## 28. TÆNIOGALE.

*Mungos*, sp.?, Ogilby, P. Z. S. 1835, p. 103.

Whiskers weak, slender. Nose grooved beneath. Toes 5—5. Claws compressed, rather elongate, very acute. Thumb short; claw distinct, rather elevated. Great toes very short, indistinct, with a small claw; hinder claws broader. Soles of the hind feet quite bald to the heel. Ears rounded. Skull oval. Teeth 42; false grinders 3/4, 3/4, first conical, second and third with three unequal tubercles; tubercular grinders  $\frac{2-2}{1-1}$ , first upper triangular, large, second short, twice as broad as long (Ogilby, *l. c.*).

Mr. Ogilby described this animal as having 42 teeth, 3 false grinders in the upper, and 4 in the lower jaw. Perhaps one tooth in the lower jaw was in exchange.

### TÆNIOGALE VITTICOLLIS.

B.M.

Black, red-washed; hair very long, soft, black, with long red tips; head black, minutely punctulated; legs and feet black; tail black; streak on side of throat black; the front claw elongate, compressed, arched.

*Mungos vitticollis*, Gray, Cat. Mam. B. M. 50 (not Ogilby); Gerrard, Cat. Ost. B. M. 72.

*Herpestes vitticollis*, Bennett, P. Z. S. 1835, p. 67; Madras Journ. 1839, p. 103, t. 2; Schinz, Syn. Mamm. 374; Temm. Esq. Zool. 111.

*Mangusta vitticollis*, Elliot, Madras Journ. of Lit. & Sci. 1840, p. 12, t. 1; De Blainv. Ostéogr. 48, t. 96.

*Mungos ? vitticollis*, Ogilby, P. Z. S. 1835, p. 103.

*Hab.* India: Madras, in thick forests (*W. Elliot*); Travancore (*P. Poole*).

Varies in the greyness of the fur and the extent and darkness of the red bay on the sides of the neck and body, there being least on the specimens that have the most grey and distinctly white rigid hairs. In some specimens (perhaps in some seasons) the whole animal has a bright bay tint from the tips of the longest hairs.

The skull is elongate, like that of *Athylax paludosus*; but the brain-case is more ventricose and higher, and the orbit smaller and

complete behind. The zygomatic arch is rather short and very much bowed out, the most convex part of the arch being rather behind the middle of its length. The contraction of the brain-case is rather behind the back of the orbit. The teeth are normal, nearly as massive as, and agreeing very generally in proportion of parts and position or form of the internal lobes with those of *A. paludosus*; but they are rather slender and longer comparatively in all their parts. The palate also is much narrower and longer. The third upper false molar has a small central internal lobe. The front edge of the flesh-tooth is fully two-thirds the length of the outer edge; the hinder lobe of it is narrow, and angular behind. The front tubercular molar has a very oblique outer edge. The brain-case is rather more than half the entire length.

The length of the skull  $3\frac{3}{4}$  inches; the width of the brain-case  $1\frac{5}{8}$  inch, of the zygomatic arch  $2\frac{1}{4}$  inches.

The lower jaw broad in front, narrow behind, without any tubercles on the lower edge under the end of the tooth-line. False grinders 4—4; the front very small, curved, close at the front of the second. The tubercular grinder very large, oblong, subcircular, with two large unequal tubercles on the front and a very large one on the hinder part of the crown.

The lower jaw of *Urva* is distinguished from that of the genus *Herpestes* by having no prominence or tubercle on the lower edge under the hinder end of the tooth-line.

### 29. ONYCHOGALE.

Body slender. Tail conical, hairy, about as long as the body. Toes 5—5; inner toes small; front claws very long, compressed, curved. Teeth 40; false grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ .

The hinder end of the skull deeply and sharply notched, instead of being transversely truncated as in the small *Herpestes*. The notch in the living animal is filled up with a cartilaginous septum.

#### ONYCHOGALE MACCARTHIAÆ.

B.M.

Red brown; hair elongate, flaccid, pale brown, with a broad, thick, subterminal band and a long whitish-brown tip; fur of hands and face shorter. Feet blackish brown; hair white-tipped. Tail redder; hair elongate, red, one-coloured. Ears rounded, hairy.

*Herpestes maccarthiæ*, Gray, B. M.; Gerrard, Cat. Osteol. B. M. 75.

*Cynictis maccarthiæ*, Gray, P. Z. S. 1851, p. 131, Mamm. pl. xxxi.; Ann. & Mag. N. H. 1853, xii. 47.

*Herpestes fulvescens*, Kelaart, Ceylou.

Hab. Ceylon (*Lady MacCarthy*).

### 30. HELOGALE.

*Helogale*, Gray, P. Z. S. 1861, p. 308; Arch. für Naturg. xxviii. (1862) p. 128.

Body slender. Head oval. Ears distant. Toes 5—5; the inner

toe small; front claws rather elongate, compressed, acute. Soles of the hind feet partly bald. Tail conical, covered with elongate hairs. Skull short, broad. Face short. Teeth 36 (see P. Z. S. 1861, p. 308, fig.); false grinders  $\frac{2-2}{3-3}$ ; the flesh-tooth triangular; tubercular grinders  $\frac{2-2}{1-1}$ .

*Herpestes tænionotus*, A. Smith, which I referred to this genus, is distinct.

### 1. HELOGALE PARVULA.

B. M.

Fur uniform blackish brown, very minutely pale-punctulated. Length of body and head 7 inches, of tail 7 inches.

*Helogale parvulus*, Gray, P. Z. S. 1861, p. 308 (fig. skull); Gerrard, Cat. Ost. B. M. 76; Heusel, Arch. für Naturg. xxviii. 128.

*Herpestes parvulus*, Sundeval; Temm. Esq. Zool. 110.

*Hab.* South Africa: Port Natal (*Sundeval*).

The skull moderate, swollen; brain-cavity ovate, contracted over the back of the orbit; nose arched; orbit incomplete behind; false grinders 2/2, front compressed, moderate, second trigonal; flesh-tooth small, broader than long, with the inner tubercle on the front edge; tubercular grinders transverse, much broader than long, the hinder about half the size of the other.

### 2. HELOGALE UNDULATA.

*H. nigro et rufo-flavido undulatus, subtus undique rufus; cauda corpore brevior, sine penicillo.*

*Herpestes undulatus*, Peters, Reise nach Mossamb. Säugeth. 114, t. 25, 1852; Gerrard, Cat. Osteol. B. M. 76; Temm. Esq. Zool. 115.

*Hab.* Eastern Africa: Mossambique; Quitangonka; from lat. 10° to 15° S.

Allied to *Herpestes microcephalus*, according to Temm. Esq. Zool. 118.

The grinders 5/5; the front claw much longer than the hinder; the skull ventricose, with a short nose.

## Tribe 11. CYNICTIDINA.

*Head short, ventricose; tail bushy, expanded laterally; claws elongate; orbit of the skull complete behind.*

### 31. CYNICTIS.

*Cynictis*, Ogilby, P. Z. S. 1833, p. 48.

Body slender. Ears short, rounded. Nose truncate, with a distinct central longitudinal groove. Tail with long hairs, flattened horizontally. Legs short. Toes 5—4; front claws elongate, compressed, arched. Soles of feet partly covered with hair. Skull short and broad, ventricose. Face moderate; forehead swollen. Teeth 38; false grinders 3/3, 3/3; flesh-tooth triangular, sides subequal; tubercular grinders 2/1, 2/1.

“M. I. Geoffroy observed that the skull described by Mr. Ogilby,

on which he founded his genus, had lost the front upper false grinder." —*Mag. Zool.* 1843, p. 7, note.

*C. melanura*, Martin, is a *Herpestes*. The type specimen which he described, now in the British Museum, has a small but distinct internal hind toe.

### 1. CYNICTIS PENICILLATA.

B.M.

The under fur short, soft, and black.

*Mangusta penicillata*, Cuvier, Règ. Anim. (ed. 2); De Blainv. Ostéogr. Viverra, t. 12 (teeth).

*Ichneumia albescens*, I. Geoff. Mag. Zool. 1839, t. 12 (not descrip.).

*Mangusta levaillantii*, A. Smith, Zool. Journ.

*Cynictis typicus*, A. Smith, South Afr. Quart. Journ. i. 53.

*C. steedmanii*, Ogilby, P. Z. S. 1833, p. 49; Trans. Zool. Soc. 1835, i. 34, t. 3 (a skull); Schinz, Syn. Mamm. i. 377.

*C. levaillantii*, Gray, Cat. Mamm. B. M. 53; Gerrard, Cat. Ost. B. M. 77.

*Meeskal*, Barrow, Trav.; Swains. Lard. Ency. 159. f. 71.

*Mangusta (Cynictes) penicillata*, De Blainv. Ost. t. 5.

Var. redder. *Ichneumia ruber*, Geoff.

*Herpestes ruber*, Licht. Mus. Berlin.

*Hab.* South Africa (*Steedman*).

The skull short and curved; the forehead convex; brain-cavity rather swollen; upper false grinders 3/3, the first very small, the third trigonal; the flesh-tooth rather longer than broad; the tubercular grinders transverse, very short and broad, the last small.

Skull broad, the width about two-thirds the entire length; the brain-case half the entire length; orbit complete behind; forehead convex, especially between and in front of the eyes. The two front upper false grinders compressed; the third subtrigonal, with a small central internal lobe; the flesh-tooth longer than broad on the front margin; the false grinder transverse, short, and very broad, subtrigonal, widest on the outer edge, the hinder much smaller.

The skull of a younger animal very similar, but larger, and the forehead not so convex and swollen before and between the eyes.

*Ichneumon rubra* (Geoff. l. c. 139), "Very splendid ferruginous red, especially the head," is said to be *Cynictis steedmanii*, Licht.

### 2. CYNICTIS OGILBII.

B.M.

Yellow, black-and-white pencilled; beneath whitish; chin, throat, and tip of tail white; ears reddish brown.

*Cynictis ogilbii*, A. Smith, S. Afr. Quart. Journ. i. 53; Illust. Z. S. Africa, Mamm. t. 16, ♂; Schinz, Syn. Mamm. i. 375.

*Hab.* South Africa: barren plains, north part of Graaff Reynet district and Bushman Flat (passes a great part of its time underground) (*A. Smith*).

Skull very like that of *C. levaillantii* (803 c); but the forehead not so convex, and the skull, though longer, is rather narrower at the zygomatic arch; the brain-cavity of the two of the same width; in the most swollen part more like 803 a. The flesh-tooth is similar to that of *C. levaillantii*.



## 3. CYNICTIS? FIMBRIATA.

Fur very pale, whitish; hairs white at the base, silky, with black and white bands and a white tip; below dirty white. The black and white rings on the silky hair of the tail are broader; the lateral hairs and the tuft at the tip are tipped by an isabella band. The feet pale brown, dotted with white.

Length of body and head 11 inches, tail inches.

*Herpestes fimbriatus*, Temm. Esq. Zool. 112.

*Hab.* India (? Temm., *Mus. Leyden*).

The account of the tail would lead one to believe that this is a *Cynictis*: but the under fur of that animal, even in the very young state, is black.

## 4. CYNICTIS LEPTURA.

B.M.

Pale foxy brown, brown-pencilled; lips, chin, and tip of the tail white; tail fulvous, grizzled, with chestnut-brown hair, with a broad central chestnut-brown ring; under side yellowish white.

*Cynictis lepturus*, A. Smith, *Illust. Zool. S. African Mamm.* t. 17; Schinz, *Syn. Mamm.* i. 376.

*C. levaillantii*, var., Gerrard, *Cat. Ost. B. M.* 77.

*Hab.* South Africa, in barren places.

The skull of *Cynictis leptura* (803 e, A. Smith) is very like that of *C. penicillata* (803 c); the forehead is convex before and between the eyes, and the teeth are very similar; but the flesh-tooth is much shorter compared with the width of the front margin, more equally triangular, as the front lobe on the inner edge is longer compared with the rest of the tooth; the hinder tubercular is rather wider and more like the front one.

B. *Nose produced; under side convex, covered with short adpressed hairs, without any bald central longitudinal groove. The fur grizzled. Tail not rigid. Soles bald and slightly covered with hair. Rhinogaleacea.*

Daubenton, in the description of the Suricate (*Hist. Nat.* xiii. 75), observes, "Les narines ressemblent à celles du chien; mais le nez n'avait pas, comme celui du chien, un sillon qui s'étendit depuis l'entre-deux des narines jusqu'à la lèvre; cet espace était convexe." The character here described does not seem to have been remarked, since, indeed, I only accidentally discovered that Daubenton had observed it, long after I had seen its importance as a characteristic in a group of Viverridæ. The same character is found in the *Mangouste* figured by M. Daubenton (t. 19); but he does not notice it in his short description of a living female of that animal.

## Tribe 12. RHINO GALINA.

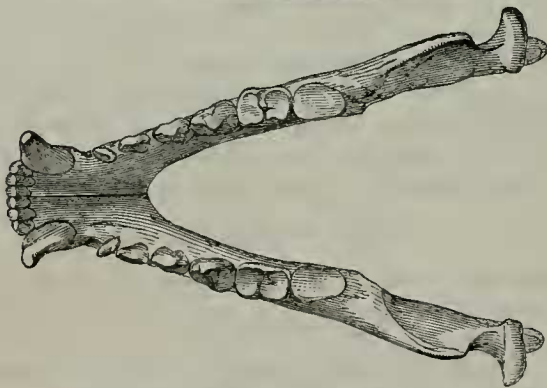
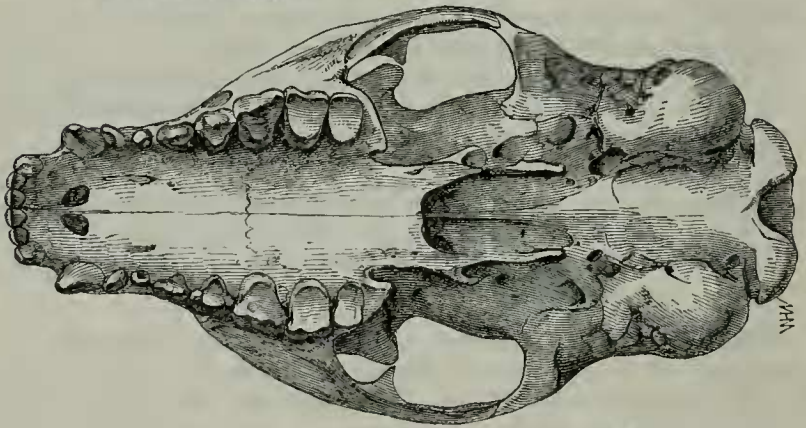
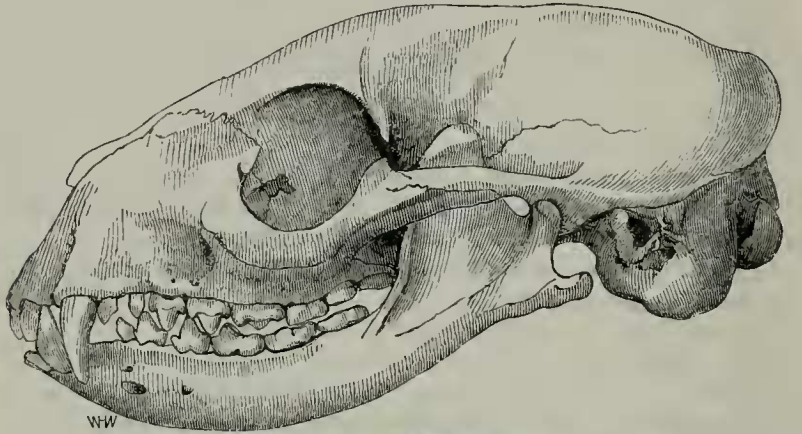
*Nose short; teeth 40; tubercular grinders 2/2.*

## 32. RHINO GALE.

Head ovate. Nose shortly produced, convex beneath. Body elongate. Toes 5—5. Claws short, compressed, acute. Tail conical,

covered with elongated hair. Skull elongate, ventricose. The orbit incomplete on the hinder edge. Teeth 40. False grinders  $3/4$ ,  $3/4$ . Flesh-tooth triangular, broad, angle rounded; inner tubercle broad, near the middle, and occupying the greater part of the inner side. Tubercular grinders  $2/1$ ,  $2/1$ ; upper broad, transverse, rounded on the side, only half as long as wide.

This genus, in the prolongation of the nose, has some affinity to *Crossarchus* and *Ryzæna*, but the elongation is much less developed.



Skull of *Rhinogale melleri*.

## RHINOGALE MELLERI.

B.M.

Grey-brown, very minutely and closely white-speckled; the middle of the hinder part of the back with an obscure, broad, darker longitudinal streak; tail (all but the base) black; nose and feet rather brown; under fur brown.

*Hab.* East Africa (*Dr. Meller*).

The skull is narrow, more especially the hinder portion. The face is short and rather narrow. The forehead and crown of the head form a gradually arched line from the end of the nose to the occiput. The cavities for the temporal muscles are moderate; they meet on the crown, just over the hinder edge of the zygomatic arch, leaving a large lozenge-shaped convex forehead between the orbits. The orbits are rather small; the hinder edge incomplete. The hinder part of the palate between the temporal muscles moderately broad and short, the hinder opening being in a line with the middle of the temporal fossæ. The grinders are short, broad, and solid; the carnassier being triangular, the sides very nearly equal, the inner side being broad and rounded and placed nearly in the middle of the inner side. The tubercular grinders are oblong, transverse, with the inner side rounded and nearly as broad as the outer one; they are much worn, showing that the animal was fully adult.

## 33. MUNGOS.

*Mungos* (partly), Ogilby, MS. (see Proc. Zool. Soc. iii. 103, 1835).

Head elongate. Nose slightly produced; underside convex, with close-pressed hairs, without any central groove. Body slender. Fur rather harsh. Tail subcylindrical, covered with harsh hairs. Toes 5—5; front inner toe strong, hinder smaller. Claws strong, acute; front rather elongate, compressed, arched. Teeth 40; false grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; flesh-tooth triangular, as broad as long; tubercular grinders  $\frac{2-2}{1-1}$ , upper transverse.

Ogilby separated the genus, because in the two African species he examined there were only  $\frac{2}{4}$  false molars.

M. Temminck, with his usual want of attention to organic peculiarities, unites these animals and *Herpestes vitticollis* as a single species (see Esq. Zool. 111).

\* *Back and tail grizzled.*

## 1. MUNGOS GAMBIANUS.

B.M.

Grey, grizzled with black and grey, hair rigid, with a broad pale ring and large black tip; streak on side of neck, feet, and end of the tail black; lips, chin, and throat white; belly reddish; hair of hind limbs elongate, reddish.

Young greyer; the black tips of the hairs shorter.

*Herpestes (Mungos) gambianus*, Ogilby, P. Z. S. 1835, p. 102; Schinz, Syn. Mamm. i. 374; Temm. Esq. Zool. 111.

*Mungos gambianus*, Gray, Cat. Mamm. B. M. 50.

*Hab.* W. Africa; Gambia (*Rendall*).

\*\* *Back cross-banded; tail obscurely ringed.*

2. MUNGOS FASCIATUS.

B.M.

Blackish, minutely grizzled with ashy; back and rump washed with reddish, with many blackish and white cross bands; nose, feet, and ends of tail blackish.

Young paler, obscurely cross-banded.

*Mungos fasciatus*, Gray, Cat. Mamm. B. M.; Gerrard, Cat. Ost. B. M. 72.

*Viverra ichneumon*, Schreb. Säugeth. t. 116 (from Buff.).

*Herpestes fasciatus*, Desm. Dict. S. N. xxix. 58.

*H. mungo*, Desm. Mamm. 211.

*H. zebra*, Rüppell, Fauna Abyss. t. 9. f. 2; Schinz, Syn. Mamm. i. 371.

*Ryzena suricata*, Children, Clapperton's Trav. Append.

*Herpestes (Mungos) fasciatus*, Ogilby, P. Z. S. 1835, p. 102.

*Mangusta mungo*, Fisch. Syn. Mamm. 163.

*Hab.* Africa: Cape of Good Hope (*A. Smith*); Lake Tschad (*Clapperton*); Gambia (*Rendall*); Abyssinia (called "Gottoni") (*Rüppell*).

The not quite adult skull is rather elongate, ventricose behind, the contraction of the brain-case being in a line with the hinder part of the orbit. The orbit imperfect behind. The zygomatic arch moderately bowed out, the more convex part being nearer the hinder end. The nose tapering on the side and above, making a shelving forehead and a slightly arched crown-line. The false molars are only two on each side, there being a short space between them and the base of the canine; the second false grinder triangular, with a good-sized lobe on the inner part of the hinder edge, and with only a very rudimentary point on the hinder outer margin. The flesh-tooth triangular, the front edge being as broad as the outer one, with a large, thick, rounded inner lobe. The first tubercular grinder transverse, short, narrowed on the inner edge; the second similar, but smaller.

Length of the skull  $2\frac{7}{12}$  inches; width of the brain-case 1 inch, of the zygomatic arch  $1\frac{1}{2}$  inch.

Lower jaw rather slender, with a rounded angle under the condyle. The false grinders  $\frac{3}{3}$ ; the first compressed, sharp-edged. Tubercular grinders rather large, with two high lateral anterior and one large posterior rather high prominence.

3. MUNGOS ADAILENSIS.

*Cinereo-flavicans, pilis nigro-fusco annulatis, vertice cerviceque nigro-schistaceis, dorso fasciis transversis obsolete nigricantibus; abdomine dilutiore, in flavidum vergente; antepedibus obscurioribus; cauda corpore parum longiore, apice attenuata haud penicillata, dorso concolore, in ultimo triente nigra, plantis denudatis; oculis pupilla, vertico-elliptica, iride fusca.*

Long. tota  $22\frac{1}{2}$ , caudæ 15 poll.

*Herpestes adailensis*, Heuglin, Peterm. Mittheil. 1861, p. 17; Nova Act. Acad. Leop. xxviii. p. 5, t. 2. f. 4 (skull).

*Hab.* Adail coast (*Heuglin*).

I do not see how this differs from *H. fasciatus*; but Herr Heuglin has them both in his list.

### Tribe 13. CROSSARCHINA.

*Nose elongate; teeth 36; tubercular grinders 2/1.*

#### 34. CROSSARCHUS.

*Crossarchus*, F. Cuv. Mamm. Lithog. iii. 47, 1825.

Head roundish. Nose elongate, much produced; the underside convex, hairy, without any central longitudinal groove; hair rigid, short, shorter on the head and throat; muffle large, callous. Pupil round. Ears rounded. Body slender. Fur harsh, with longer and more rigid hairs. Tail slightly compressed, tapering, covered with shorter hair. Toes 5—5, free; two middle toes longest; front inner toe large, hinder smaller. Soles naked. Claws rather elongated, compressed, hooked, acute, sometimes very much so. Teeth 36; false grinders 2/3, 2/3; flesh-teeth 1/1, 1/1; tubercular grinders 2/1, 2/1.

#### CROSSARCHUS OBSCURUS.

B.M.

Uniform deep brown; head rather paler; hairs brown, with yellow tips.

Length of body and head 12 inches, of tail 7 inches.

*Crossarchus obscurus*, Cuv. R. A. i. 158; Martin, P. Z. S. 1834, p. 114 (anat.); Fischer, Syn. Mamm. 166; Schinz, Syn. Mamm. i. 379; Gerrard, Cat. Ost. B. M. 77; Temm. Esq. Zool. 117; De Blainv. Ostéogr. 49, 99, t. 12.

*C. typicus*, A. Smith, S. African Quart. Journ. ii. 135.

"*C. dubius*, F. Cuv.," A. Smith.

*La Mangue*, F. Cuvier, Mamm. Lithogr. ii. pl. 199.

*Hab.* Western Africa—Guinea (called "Aevisa"), living in deep holes with many openings (*Temm.*). Eastern Africa?

*Crossarchus rubiginosus*, Wagner, Suppl. Schreb. ii. 329. Bay brown; feet and tip of the tail black. Length 16½ inches, of tail 12 inches.

*Hab.* East Indies (*Wagner*).

#### 35. EUPLERES.

*Eupleres*, Doyère, Ann. Sci. Nat. 1835, iv. 281; De Blainv. Ostéogr. Viverra, t. 8.

Skull ventricose, very much produced, slender, compressed; lower jaw compressed and produced in front. Nose elongate, slender, acute, probosciform; underside — ?, with a small muffle. Eyes large. Ears large and triangular. Body vermiform. Legs moderate. Tarsi elongate, hairy beneath; a very slender bald streak to the heel, like *Genetta*, but not so distinct. Toes 5—5, apparently

united, with scattered hairs above; thumb very short; great toe short and high up. Claws acute, semiretractile. Fur thick, formed of silky hairs, with a short close under fur. Tail elongate, cylindrical, rather tapering, covered with hair. Cutting teeth 6/6; canines small, compressed; false grinders 3, very small, compressed, far apart, the hinder with a small central internal lobe; the flesh-tooth triangular, about as long as wide, the inner lobe central; tubercular grinder trigonal, somewhat like the flesh-tooth (see De Blainv. Ostéogr. Viverra, t. 8. f. 1-4, from a young animal).

According to M. de Blainville's figure of the skull, this genus (which I have never been able to examine) is properly referred to the Viverridæ.

M. Doyère referred it to the Insectivora (see Ann. Sci. Nat. iv. 278); but, to make this alliance, he considers the front double-rooted tooth in the lower jaw a canine.

M. de Blainville, in his essay on "Mamm. Insectivores," in 'Annales Fr. et Etrang. d'Anat. et de Physiol.' ii. p. 1, justly observes, "the *Eupleres*, which has been referred to the Insectivora, on examination has proved to be allied to *Mangusta*, or to the section *Genetta* of the *Viverridæ*" (l. c. 37).

#### EUPLERES GOUDOTII.

Fur very dark brown; under fur fulvous, with black transverse streaks over the shoulder; throat and beneath whitish.

*Eupleres goudotii*, Doyère, Ann. Sci. Nat. 1835, iv. 281, t. 18 (animal and skull); De Blainv. Ostéogr. Viverra, t. 8 (skull); Gerrard, Cat. Ost. B. M. 71; Schinz, Syn. Mamm. i. 259.

*Falanoue*, Harcourt, Madagascar.

Length 12 inches, of tail 5 inches.

*Hab.* Madagascar, at Tamatave, in burrows (called "Falanove") (*Goudot*) (*Mus. Paris*).

#### 36. SURICATA.

*Suricata*, Desm. N. Dict. H. N. xxiv. 16, 1804.

*Ryzæna*, Illiger, Prodr. Mamm. 1812.

Head spherical. Nose elongate, produced; underside hairy, convex, without any central groove; muffle callous; nostril long, opening on the sides. Ears rounded, nakedish internally. Body elongate; hair soft, annulated. Legs moderate. Toes 4-4; hind soles hairy. Claws long; front very long, slender, compressed, arched; anal glands two. Tail tapering, slender, covered with short hair, and rather pencilled at the tip. Teeth 36; false grinders 2/3, 2/3; flesh-teeth 1/1, 1/1; tubercular grinders 2/1, 2/1.

#### SURICATA ZENICK.

B.M.

Grey; orbit and tip of the tail black; hinder part of the back with dark cross bands; chin, throat, and vent whitish; tail rather redder, underside lighter, under fur reddish.